



SIM7020 Series_Ayla _Application Note

LPWA Module

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About Document

Version History

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V1.01	2018.08.07	Albert Meng	Revised
V1.02	2019.05.10	Wenjie.lai	Second Release
V1.03	2020.06.10	Xiaohui.Xu	All

Scope

This document applies to the following products

Name	Type	Size(mm)	Comments
SIM7020C	NB1	17.6*15.7	Band 1/3/5/8
SIM7020E	NB1	17.6*15.7	Band 1/3/5/8/20/28
SIM7030	NB1	16*18	Band 1/3/5/8
SIM7060	NB1+GNSS	24*24	Band 5/8
SIM7020G	NB2	17.6*15.7	Band 1/2/3/4/5/8/12/13/17/18/19/20/25/26/28/66/70/71/85
SIM7060G	NB2+GNSS	24*24	Band 1/2/3/4/5/8/12/13/17/18/19/20/25/26/28/66/70/71/85

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1 Introduction

1.1 Purpose of the document

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

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

1.2 Related documents

[1] SIM7020 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;

2 Ayla Cloud AT commands

2.1 AT+CAYLACFG Set Various Configuration Parameters

AT+CAYLACFG Set various configuration parameters	
Test Command AT+CAYLACFG=?	Response +CAYLACFG: "feature","Value/mode"[,"mod_name","log_level"] OK
Write Command AT+CAYLACFG=<feature>,<value/mode>[,<mod_name>,<log_level>]	Response OK or ERROR Unsolicited result code: If fail, return: +CAYLACFG: <error code>
Parameter Saving Mode	NO_SAVE
Maximum Response Time	-
Reference	

Defined Values

<feature>	<p>"fdsn" Set DSN for factory production</p> <p>"fpubkey" Set up Pubkey for factory production</p> <p>"oem" Set oem id</p> <p>"model" Set oem model</p> <p>"key" Set oem key</p> <p>"region" Input area. In China, Unicom Elayun is set to "CNCU", others are set to "CN", and other countries in the world are set to "US".</p> <p>"mfg_model" Writing production models</p> <p>"mfg_serial" Write the production serial number</p> <p>"uid" Set uid, the length cannot exceed 10.</p> <p>"time" Set the time in the format "YYYY-MM-DDThh:mm:ss"</p> <p>"log" Set the level of the log. The second parameter is "--mod" or "save". If it is "--mod", it must have a third and fourth parameter to set the log level. If it is "save", it means that the currently set log level has been saved to NVRAM, and the saved log level will be read when the</p>
------------------------	--

	Ayla connection is initialized.
<value/mode>	Configure different values directly according to different features when <feature> is not "log". When <feature> is "log", this parameter must be one of "--mod" or "save". The save command will save the set log level to flash, and the next boot is also valid. If you do not execute save, The log level adjustment is only valid for this connection.
<mod_name>	Refers to the log level of which unit needs to be configured. It can be mod, client, conf, dnss, notify, ssl, sched, test or all. all indicates that the log level of all units should be configured
<log_level>	The log level of a specific unit. The log levels that can be set include pass, fail, info, debug, debug2, metric, all, and none. All means to open all the cells of a unit or all units (<mod_name> is all), and none means to remove all logs. Note: ayla will have a minimum log level, including error and warning, even in the case of none, there will be log of error and warning level
<error code>	Use a numeric code to indicate the type of error. -1 indicates a time setting error.

2.2 AT+CAYLACFGCHECK Configuration Parameter Check

AT+CAYLACFGCHECK Configuration Parameter Check	
Test Command AT+CAYLACFGCHECK=?	Response +CAYLACFGCHECK: "feature","value" OK
Write Command AT+CAYLACFGCHECK=<feature>,<value>	Response +CAYLACFGCHECK: <n> OK or ERROR
Parameter Saving Mode	NO_SAVE
Maximum Response Time	-
Reference	

Defined Values

<n>	Integer type, indicating the result of the check. 1 Check pass
-----	---

	0 Check failed
<feature>	string, check the name of the parameter. "fdsn" Check the DSN set at the time of factory production "fpubkey" Check the set pubkey "oem" Check the OEM id of the settings "model" OEM model for checking settings "key" OEM key used to check the settings "region" Check the input area "mfg_model" Check the written production model "mfg_serial" Check the written production serial number "uid" Check the written uid
<value>	string, check the value of the parameter.

2.3 AT+CAYLASET Reporting Data and Reading Data Sent by the Cloud

AT+CAYLASET Reporting data and reading data sent by the cloud

Test Command AT+CAYLASET=?	Response +CAYLASET: "name",(0-2),"value",(4-1024) OK
Write Command AT+CAYLASET=<name>,<type>,<value>,<len>	Response OK
Parameter Saving Mode	NO_SAVE
Maximum Response Time	-
Reference	

Defined Values

<name>	Attribute name of the dynamic template configuration.
<type>	Attribute data type of dynamic template configuration, 0 is an integer, 1 is a String type, and 2 is a Boolean type.
<value>	The value of the data that needs to be sent to the cloud, which needs to be set according to different <type>. When the integer <type> is 0, the value ranges from -2147483648 to 2147483647. When the string type <type> is 1, the string length is 1024. When the Boolean type <type> is 2, the value can be 0 or 1.
<len>	Integer value, length of <value>, when type is 0 and 2, <len> needs to

be set to 4. When type is 1, the size of <len> needs the length of the actual string

NOTE

- Note that this command needs to be executed in the state of connecting to the cloud, otherwise it returns error.

2.4 AT+CAYLASTATUS Query Cloud Server Connection Status

AT+CAYLASTATUS Query cloud server connection status

Read Command AT+CAYLASTATUS?	Response +CAYLASTATUS: <status>[,<reason>] OK
Parameter Saving Mode	NO_SAVE
Maximum Response Time	-
Reference	

Defined Values

<status>	Integer, indicating the current connection status. 0 Not connected 1 Connecting 2 Connected
<reason>	Integer type, indicating the reason for the current connection. 0 Unknown reason 1 Failed to get DNS 2 Failed to establish SSL connection 3 User manually disconnected 4 Network reasons

2.5 AT+CAYLASERVICE Set the AYL System Operating Mode

AT+CAYLASERVICE Set the AYLA system operating mode

Test Command AT+CAYLASERVICE=?	Response +CAYLASERVICE: <n> OK
Write Command AT+CAYLASERVICE=<n>	Response OK or ERROR
Parameter Saving Mode	NO_SAVE
Maximum Response Time	-
Reference	

Defined Values

<n>	<p>Integer, indicating the Ayla mode of operation.</p> <ul style="list-style-type: none"> 0 Ayla cloud connection will not be started automatically after booting, and it will take effect after the next boot. 1 Start the Ayla cloud connection automatically after booting, and the next boot will take effect. 2 Connect to the Ayla cloud immediately, if it is currently connected, the return fails. 3 Disconnect the current Ayla cloud connection. If it is not currently connected, the return fails.
-----	---

2.6 AT+CAYLATEMPLATE Dynamic Configuration Template

AT+CAYLATEMPLATE Dynamic configuration template

Test Command AT+CAYLATEMPLATE=?	Response +CAYLATEMPLATE: "id"[,"name/version/flag"],(0-2),(0-1)] OK
Write Command AT+CAYLATEMPLATE=<id>[,<name/version/flag>[,<type >,<direction>]]	Response OK or ERROR Unsolicited result code: If fail, return: +CAYLATEMPLATE: <error code>

Parameter Saving Mode	NO_SAVE
Maximum Response Time	-
Reference	

Defined Values

<id>	<p>has the following four parameter behaviors to choose from:</p> <p>"add" Dynamically add an attribute, cannot be used alone, need subsequent parameters, including attribute name, type, direction</p> <p>"del" Delete attribute, can be used alone, means to delete the entire template, such as with parameters, just need to add a property name to be deleted</p> <p>"oem_host_version" The version number corresponding to the configuration template. Which template needs to be connected to the device after connecting to ayla. It can be configured with "oem_host_version", followed by a parameter, the version number of "oem_host_version".</p> <p>"save" When the parameter followed by save is 1, save the template to NVRAM, indicating that the template has been added, the client can connect to Ayla cloud, and set the flag of the modified template to 1, the client cannot modify the template in this state.</p> <p>If the parameter added after "save" is 0, only the flag of the template is set to 0, and the client can modify the configuration dynamic template again.</p> <p>Note that this command cannot be executed when the cloud is connected or the cloud is already connected, and error will be returned..</p>
<name/version/flag>	<p>When <id> is "oem_host_version", this entry is <version>, indicating the version number. When <id> is "save", this entry is <flag>, which takes 0 or 1, <id > When "add" or "del", this item indicates the name of the attribute.</p>
<type>	<p>Integer, which can be 0, 1, 2, indicating the data type.</p> <ul style="list-style-type: none"> 0 Integer 1 String type 2 Boolean
<direct>	<p>Integer, can be 1 or 0.</p> <ul style="list-style-type: none"> 0 One-way, only device to server 1 Two-way, from server to device and from device to server
<error code>	<p>Use a numeric code to indicate the type of error.</p> <ul style="list-style-type: none"> -1 Indicates that the template is not currently in edit mode, and the template cannot be operated. If you need to operate the template, you need to execute "AT+CAYLATEMPLATE=save,0" first. -2 Indicates that the current "Oem_host_version" value cannot be modified in edit mode. To modify, you need to execute

"AT+CAYLATEMPLATE=save,1" first.

2.7 +CAYLARECEV Reporting data

+CAYLARECEV Reporting data

It indicates that the data received by the cloud is reported to the URC.

Response

+CAYLARECEV: <name>,<data>

Defined Values

<name>	Template attribute name
<data>	The value corresponding to the attribute, which can be an integer, a string type, and a Boolean type.

2.8 +CAYLASTATUS Connection Status

+CAYLASTATUS Connection Status

Indicates the current cloud server connection status and reports it to the URC.

Response

+CAYLASTATUS: <status>

Defined Values

<status>	Integer type, indicating the current connection status. 0 not connected 1 Connecting 2 Connected
----------	---

3 Bearer Configuration

Usually module will register PS service automatically.

3.1 PDN Auto-activation

//Example of PDN Auto-activation.

```
AT+CPIN? //Check SIM card status
+CPIN: READY

OK
AT+CSQ //Check RF signal
+CSQ: 20,0

OK
AT+CGREG? //Check PS service
+CGREG: 0,1

OK
AT+CGACT? //Activated automatically.
+CGACT: 1,1

OK
AT+COPS? //Query Network information, operator and network
+COPS: 0,2,"46000",9 mode 9, NB-IOT network

OK
AT+CGCONTRDP //Attached PS domain and got IP address
+CGCONTRDP: automatically.
1,5,"cmnbiot","100.80.73.123.255.255.255.0"

OK
```

3.2 APN Manual configuration

If not attached automatically, could configure correct APN setting.

//Example of APN Manual configuration.

```
AT+CFUN=0 // Disable RF
+CPIN: NOT READY

OK
AT*MCGDEFCONT="IP","cmnbiot" // Set the APN manually
OK
AT+CFUN=1 //Enable RF
OK

+CPIN: READY
AT+CGREG? //Inquiry PS service .1 indicates PS has attached.
+CGREG: 0,1

OK
AT+CGCONTRDP //Attached PS domain and got IP address
+CGCONTRDP: automatically
1,5,"cmnbiot","100.80.73.123.255.255.255.0"

OK
```

4 Ayla Cloud Examples

//Example of Ayla Cloud Process.

```

AT+CAYLACFG="fdsn",SC000W000017745 //Configure dsn
OK
AT+CAYLACFG="oem",528225f6 //Configure oem id.
OK
AT+CAYLACFG="model",ledevb //Configure model.
OK
AT+CAYLACFG="key",17b0bdd6fe06f210f7fafc0d22431 //Configure oem key.
7b3
OK
AT+CAYLACFG="pubkey","MIIBCgKCAQEAtn3WFFJT //Configure pubkey , Note that there
aZCpTOG/4CPje6QZw5U8j61aoDuvxgRDW33MBTzrl5f should be no line breaks in the middle of
wR7VXAVKtSLvTZma3AZgzwZp9XrmTcvEPN9t4vFAm+ the key data string.
/Y0bSKqol3fEuGq80qH5G4+nkVvZcwoSak9Q8KpDrHjj
J0FLOZA5KpCytXiwHUb00+gm54kxRleTmCix41kFCkT
d+BcU/yo1eFGF9z2oJtCPXqJnADSb+v2/ChQQTrPNno
WTj/p3UIVq/a/W4SdK5BITEJOti2FOx2JGEInxujKk10WF
x8zykg5kaKZqEnasH+Ao1F1lyql7Sr4RTOSouQw19Awr
Clk7y6X8TQcEycQy0ldz1t1gE6pwwIDAQAB"
OK
AT+CAYLACFG="region",CN //Configure uid
OK
AT+CAYLACFG="uid",SIM1001 //Configure region (CN or US, Unicom
Ella is set to "CNCU")
OK
AT+CAYLATEMPLATE=add,intinput,0,1 //Create a template dynamically,
attributes 1
OK
AT+CAYLATEMPLATE=add,boolinput,2,1 //Create a template dynamically,
attributes 2
OK
AT+CAYLATEMPLATE=add,stringinput,1,1 //Create a template dynamically,
attributes 3
OK
AT+CAYLATEMPLATE=add,version,1,0 //Create a template dynamically,
attributes 4
OK
AT+CAYLATEMPLATE=add,outputint,0,0 //Create a template dynamically,
attributes 5
OK
AT+CAYLATEMPLATE=save,1 //After the dynamic template is created,
you must send a save command to save
it. Otherwise, it will not be saved.
OK
AT+CAYLATEMPLATE=oem_host_version,"1.5_sim702 //After the template is saved, you must

```

0"	configure the template version number.
OK	Note that this version number must correspond to that created in the Ayla Cloud Server, otherwise the template will not match when connected.
AT+CAYLASERVICE=2	//Connect to Ayla Cloud.
OK	
AT+CAYLASET="intinput",0,123,4	//Send data to the cloud.
OK	
AT+CAYLASET="boolinput",2,1,4	//Send data to the cloud.
OK	
AT+CAYLASET="stringinput",1,"abcdef",6	//Send data to the cloud.
OK	
AT+CAYLASET="outputint",0,456,4	//Send data to the cloud
OK	
+CAYLARECEV: intinput,666	//Received data sent by the cloud and reported by the URC
+CAYLARECEV: boolinput,1	//Received data sent by the cloud and reported by the URC
+CAYLARECEV: stringinput,abab	//Received data sent by the cloud and reported by the URC
AT+CAYLASERVICE=3	//Disconnect the current Ayla cloud connection
OK	

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