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Created By	Bejo Li

GIOT AT command for Lora module

Modification History

Date	Change log	Author	Revision
2015/12/24	fork document	BeJo	0.1.0
2016/01/21	Add tx delay command Update command group Add channel assignment cmd	BeJo	0.1.1
2016/02/01	Update command group	Gavin	1.0.0
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2016/03/04	Add DTX with number format Add baud rate description	Gavin BeJo	1.0.1
2016/03/22	Add I/O usage 1.0.2 Released	BeJo	1.0.2

1 Purpose

1.1 Scope

This document is intended as a reference guide to the usage of the AT command set for the LoRa module unit. This document only applies to the Gemtek GIOT series.
The intended audience for this document are the field test engineers, product and intelligent peripheral developers.

1.2 Terms and Abbreviations

Asynchronous
A serial data transmission method that uses Start and Stop bits to synchronize reception.
AT Commands
A group of commands that can be sent by a terminal or host computer to control the ISU in Command mode.
Baud
One signalling element per second. This is a measure of the signalling rate on the telephone
LMU
Lora module unit
LoRaWAN
Long Range network protocol

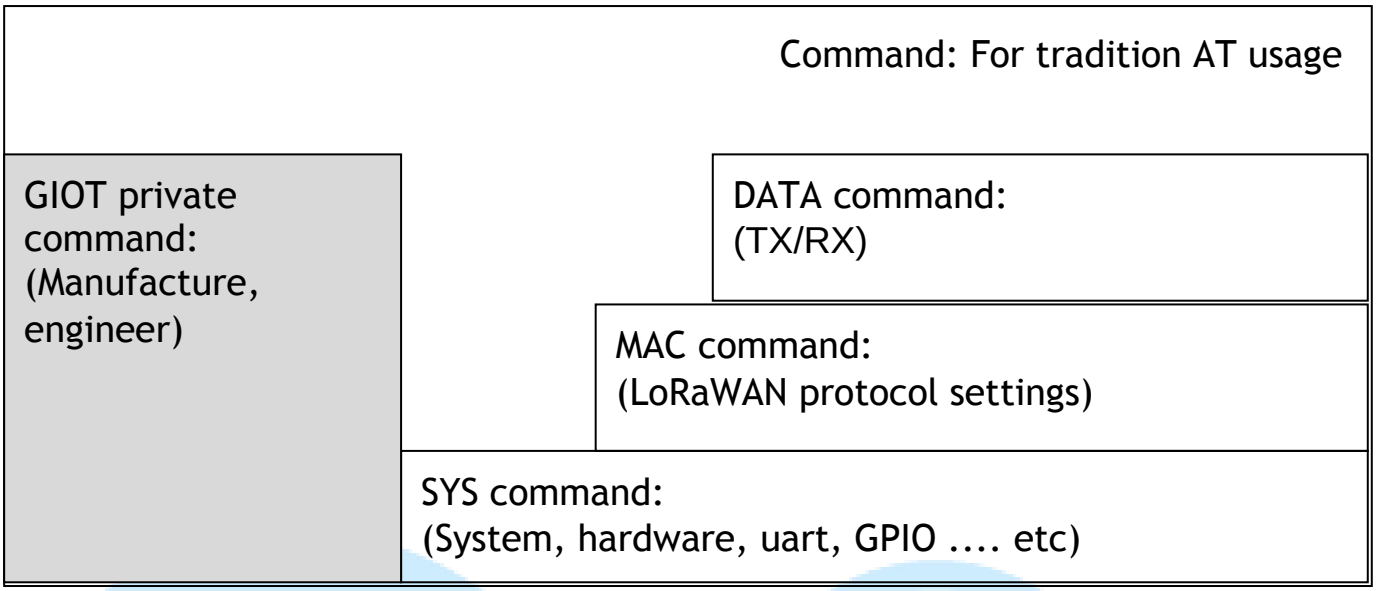
1.3 Uart

Uart - Universal Asynchronous Receiver/Transmitter, the baud rate is depend on hw platform. We expect that default baud is 9600.

2 Command Overview

2.1 Command groups

The LMU employs three principle types of AT commands group: common, data, mac, sys and GIOT private. The two types have differing syntax used to query and update their settings. They also have unique reference standards.



2.1.1 Common commands

These commands are used to perform AT behavior or debug useage.

2.1.2 Data commands

A specific communication AT command is used to transmit and receive LoRaWAN message. It consist of all ASCII alpha character but below list is not accepted: (TBD)

2.1.3 MAC Configuration commands

Media access control command. Configuration of AT commands is for query and adjust LoRaWANTM protocol settings. Most configuration commands include a prefix of + followed by a single alpha character.

2.1.4 SYS Configuration commands

Configuration of AT commands is for query and adjust hardware(GPIO, System timer, etc). Most configuration commands include a prefix of + followed by a single alpha character.

2.1.5 GIOT private commands

This command type is only for engineer and manufacture useage. Before verify with password these command CANNOT be executed.

2.2 Commands example

Example:

Enter:	AT+SGMR?	Display firmware version
LMU return:	+SGMR:"1.1.0"	Revision for the LUM
Enter:	AT+CSF=9	Set spreading factor to LMU
LMU return:	OK	SF was setted correctly

2.3 Commands line

ATCMD1<CR>
ATCMD2=12<CR>
AT+CMD3=,,15;<CR>
AT+CMD4?<CR>
AT+CMD5=?<CR>

<CR> command line termination character
,, subparameters may be omitted
+ extended command
; extended commands are delimited with semicolon

2.4 Information responses and result codes

<CR><LF>+CMD1:3,0,14,"GIOT"<CR><LF>
<CR><LF>+CMD2: (0-3),(0,1),(0-12,15),("GIOT","GEMTEK")<CR><LF>
<CR><LF>OK<CR><LF>

+CMD1 is response of +CMD1?
+CMD2 is response of +CMD2=?
0-12 means range like 0~12
"GIOT" as a string
If the command line is performed successfully, the string “OK” is sent.

2.5 Error of responses

<CR><LF>+CMD ERROR:<reason><CR><LF>

All command need to have ERROR reply
If the command is not supported or unknown, either "+CMD ERROR: unknown" or "+CMD ERROR:operation not supported" is sent

2.6 Default value

If the command parameters are optional, they can be left out in the command line. If not otherwise specified, the default values are assumed as follows
In case of Number type parameters, the default value is 0
In case of String type parameters, the default value is an empty string

3 AT command list

Command support list depends on each platform. Before development, please using AT&H to list down available commands for reference.
Remark level:
A - Should ready on first released
B - Should planing on first released
C - Next round

3.1 Common command list

Command	Description	Remark	Status
AT	Attention command	A	Done
A/	Repeat previous command line	A	Done
ATZ	Reset peer client device	A	Done
AT&F	Resets the current profile to factory-defined defaults.	A	Done
AT&W	Store current configuration	A	Done
AT&H	List all available AT commands	A	Done

3.2 Data command list

Command	Description	Remark	status
AT+DTX	Transmit message to LoRa server	A	Done
AT+DRX	Query the latest message from buffer of LMU	B	Done
AT+DTTX	Transmit dummy message to LoRa server	A	Done

3.3 MAC Configuration command list

Command	Description	Remark	status
AT+CSF	Spreading factor	A	Done
AT+CSID	Query System ID	A	Done
AT+CPIN	Query PIN code	A	Done
AT+CSQ	Signal strength indication		Progress

3.4 SYS Configuration command list

Command	Description	Remark	status
AT+IBR	Specifies the data rate(baud rate) at which the DCE accepts commands on UART interface.	A	Done
AT+ECHO	Enable or disable uart echo	A	Done
AT+CBC	*Battery level	C	Optional
AT+SPWMOD	*Select power saving mode of LMU	C	Optional
AT+SLMR	Revision of LoRa module	A	Done
AT+SGMR	Firmware version	A	Done
AT+SGMI	Manufacture ID	A	Done
AT+SGMM	Model identification	A	Done
AT+SGMD	MAC and serial number of LMU	A	Done

4 Command Descriptions

4.1 Definitions

GIOT AT is "GIOT's Attention" which sending from TE(Terminal Equipment) or DTE(Data terminal equipment) to TA(Terminal Adapter) or DCE (Data Circuit Terminating Equipment). There are four types:
No variable command: AT[+|&]<Command>
Example: ATZ, AT+DTX, AT&H

Read command: AT[+|&]<Command>?
Example: AT+CLMR?

Test command: AT[+|&]<Command>=?
Example:AT+CLMR=?

Execute/Set command: AT[+|&]<Command>=<var1>,<var2>...
Example:AT+CSF=9

4.2 Common command

■ AT

The AT commands are used to control the operation of your LMU. They are called AT commands because the characters AT must precede each command to get the ATtention of the device. This command always returns OK. It can use to wake-up device.

Type	Syntax	Response/Action
	AT	OK

■ A/

This command repeats the last command of the open session. Only the A/ command itself cannot be repeated. If this command is the first one of the open session, the response is OK without any treatment.

Type	Syntax	Response/Action
	A/	
Example	AT+SLMR?	+SLMR:"1.1.0"

	A/	OK +SLMR:"1.1.0" OK

■ ATZ

This command restores the configuration profile from non-volatile memory (EEPROM) and reset LMU.

Type	Syntax	Response/Action
	ATZ	none

■ AT&F

Restore factory-defined defaults to memory(EEPORM). IBR and ECHO will be reset.

Type	Syntax	Response/Action
	AT&F	OK

■ AT&W

This command saving the current profile to non-volatile memory (EEPROM)

Type	Syntax	Response/Action
	AT&W	OK

■ AT&H

List all available AT commands

Type	Syntax	Response/Action
	AT&H	... OK

Example:
AT&H AT,A/,ATZ,AT&F,AT&W,
+IBR, +DTX, + CSID,...
OK

4.3 Data command

■ AT+DTX

Transmit message through LMU. Transmitting mode supports two ways, asynchronous and synchronous, depend on configuration command AT+CSYNC
Synchronous mode: Transmitting done with RF then return OK
Asynchronous mode: Messages store in LMU memory buffer, then return OK

Type	Syntax	Response/Action
Set	AT+DTX=<length>,<val> NOTE: length of val is 11 with ASCII character NOTE: length of val is 22 with Hex	OK When error: +DTX ERROR:<report>
Read	None	
Test/Help	AT+DTX=?	+DTX=11,"char with 11 length" OK

Example:
AT+DTX=11,"12345ABCdef" OK
AT+DTX=22, 0123456789abcdef012345 OK

NOTE: The char " can not be transmitted through ASCII mode

■ AT+DRX

Query message from buffer of LMU and clear by read.

Type	Syntax	Response/Action
Set	None	

Read	AT+DRX?	+DRX:<length>,<Hex> OK When error: +DRX ERROR:<report>
Test/Help	None	

Example:

AT+DRX? +DRX:11,"12345ABCdef"
OK

■ AT+DTTX

Transmit debug message through LMU to cloud server for testing purpose.

Content of message: MAC address of LMU.
EX: 04000001 will be transmit to cloud server.

Type	Syntax	Response/Action
Action	AT+DTTX	OK
Read	None	
Test/Help	None	

Example:

AT+DTTX OK

4.4 MAC command

■ AT+CSF

Change the spreading factor of LMU

Type	Syntax	Response/Action
Set	None	

Read	AT+CSF?	+CSF:<Tx val>,<Rx val> OK
Test/Help	AT+CSF=?	+CSF=<6-12 or 50>,<6-12 or 50>

Example:
AT+CSF? +CSF:9,10
OK

■ AT+CSID

Update and query system ID of LMU

Type	Syntax	Response/Action
Set	None	
Read	AT+CSID?	+CSID:"System ID" OK
Test/Help	None	

Example:
AT+CSID? +CSID:"04"
OK

■ AT+CPIN

Update and query PIN code of LMU

Type	Syntax	Response/Action
Set	None	
Read	AT+CPIN?	+CPIN:<value> OK
Test/Help	None	

Example:
AT+CPIN? +CPIN:1234
OK

■ AT+CSQ

Scanning for signal strength indication (TBD)

Type	Syntax	Response/Action
Set	None	
Read	AT+CSQ?	+CSQ: 1:<Channel 1 rssi> 2:<Channel 2 rssi> … 15:<Channel 15 rssi>
Test/Help	None	

Example:

AT+CSQ? +CSQ:
RSSI:

0:-157
1:-157
2:-157
3:-157
4:-157
5:-157
6:-157
7:-157
8:-164
9:-164
10:-164
11:-157
12:-157
13:-157
14:-157
15:-157
OK

4.5 SYS command

■ AT+IBR

Specifies the data rate(baud rate) at which the DCE accepts commands on UART interface. The default value is 9600.

Note:

1. Please make sure cable quality with device, if you want to select baud rate over 9600.
2. The working baud rate depends on your cable quality and uart chipset of host.

Type	Syntax	Response/Action
Set	AT+IBR=<val> <val> 0 - Default 1 - 9600 bit/s 2 - 19200 bit/s 3 - 38400 bit/s 4 - 57600 bit/s 5 - 115200 bit/s	OK
Read	AT+IBR?	+IBR:<val> OK
Test/Help	AT+IBR=?	+IBR=(0-5) OK

Example:

AT+IBR=0 OK

AT+IBR? +IBR:0

OK

■ AT+ECHO

Enable or disable uart echo function

Type	Syntax	Response/Action
Set	AT+ECHO=<0,1>	OK

Read	AT+ECHO? <val> 0,1	AT+ECHO:<val> OK
Test/Help	AT+ECHO=?	+ECHO=<0,1> OK

Example:
AT+ECHO=1 OK
AT+ECHO? +ECHO:1
OK

■ AT+CBC
Battery level

Type	Syntax	Response/Action
Set	None	
Read	AT+CBC? <val> 0 ~100 (%)	AT+CBC:<val> OK
Test/Help	None	

Example:
AT+CBC? +CBC:60
OK

■ AT+SPWMOD
Select power saving mode of LMU

Type	Syntax	Response/Action
Set	AT+SPWMOD=<val>	OK

	<val> 0 - normal 1 - sleep	
Read	AT+SPWMOD?	+SPWMOD:<val> OK
Test/Help	AT+SPWMOD=?	+SPWMOD=(0-1) OK

Example:

AT+SPWMOD=0 OK

AT+SPWMOD? +SPWMOD:0

OK

■ AT+SLMR

Displays the revised hardware version.

Type	Syntax	Response/Action
Set	None	
Read	AT+SLMR?	+SLMR:<val> OK
Test/Help	None	

Example:

AT+SLMR? +SLMR:"0.1"

OK

■ AT+SGMR

Displays the firmware version of LMU

Type	Syntax	Response/Action
Set	None	
Read	AT+SGMR?	+SGMR:”val”

		OK
Test/Help	None	

Example:
AT+SGMR? +SGMR:"1.1.0"
OK

■ AT+SGMI
Displays the manufacturer identification.

Type	Syntax	Response/Action
Set	None	
Read	AT+SGMI?	+SGMI:”val” OK
Test/Help	None	

Example:
AT+SGMI? +SGMI:"GEMTEK"
OK

■ AT+SGMM
Displays the Model identification.

Type	Syntax	Response/Action
Set	None	
Read	AT+SGMM?	+SGMM:”val” OK
Test/Help	None	

Example:
AT+SGMM? +SGMI:"WSMS-116_BLKD"
OK

■ AT+SGMD

Query the MAC and serial number.

Type	Syntax	Response/Action
Set	None	
Read	AT+SGMD?	+SGMD:”mac”,”snl” OK
Test/Help	AT+SGMD=?	+SGMD="MAC:length is 8","SN:length is 13"

Example:

AT+SGMD? +SGMD:"00000179","GLN015430004D"
OK

Abandon Command