LoRa AT Command List

(Version: LORA-AT-CMD-V0.2)

SoluM Software Group

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Background & Summary

The purpose of this document is to describe for LoRa AT Command Lists. This document is intended for the programming or testing to implement LoRa module.

Revision History

Revision	Date	Author	Descriptions
V0.1	16.06.22	Park JungWhan	Created
V0.2	16.06.22	Park Jaehee	Add command and overview,

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1 Introduction

1.1 Purpose

The purpose of this document is to describe the AT Commands to implement and test with Solu-M's LoRa module. This document is intended for the programming or testing to implement LoRa module as a guideline.

The main function of the specification shall be on the testing of LoRa Module.

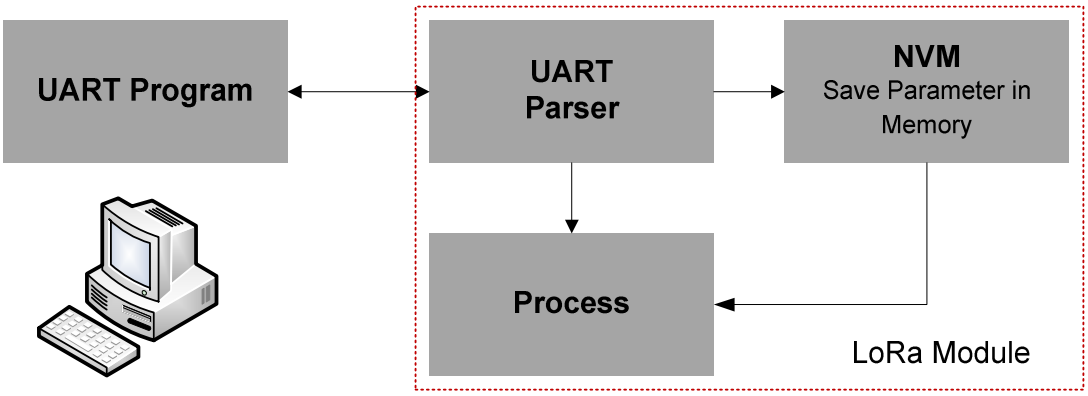
- AT Command Lists
- Description for using each command
- Checking the status of LoRa Module.

1.2 Definition, Abbreviations and Acronyms

No	Terminology/Abbreviation	Description
1	LoRa	Long Range
2	NVM	Non Volatile Memory
3		
4		
5		
6		
7		
8		
9		
10		
11		

2 Test Command Architecture

2.1 System Context View



<Figure 1: Test Command Architecture >

The above figure depicts an overall architecture for testing with AT command. The UART Program sends command with 921600 baud rate.

3 AT Command Overview

<table>
<tr><th>No</th><th>Command</th><th>Usage</th><th>Description</th><th>R/W</th></tr>
<tr><td>1</td><td>AT</td><td>AT</td><td>Check serial connection</td><td>R</td></tr>
<tr><td>2</td><td>AT+RST</td><td>AT+RST<CR></td><td>Reset the module</td><td>W</td></tr>
<tr><td>3</td><td>AT+ECHO</td><td>AT+ECHO<CR></td><td><TBD>Enable / Disable echo</td><td>R/W</td></tr>
<tr><td>4</td><td>AT+SCFG</td><td>AT+SCFG<CR></td><td><TBD>Configuration</td><td>R/W</td></tr>
<tr><td>5</td><td>AT+FRST</td><td>AT+FRST<CR></td><td><TBD>Factory Reset</td><td>R/W</td></tr>
<tr><td>6</td><td>AT+VCFG</td><td>AT+VCFG</td><td>Get configuration</td><td>R</td></tr>
<tr><td>7</td><td>AT+DEUI</td><td>AT+EUI<EUI1>…<EUI8><CR></td><td>EUI Address</td><td>R/W</td></tr>
<tr><td>8</td><td>AT+DADD</td><td>AT+DADD<ADDR1>…<ADDR4><CR></td><td>Device Address</td><td>R/W</td></tr>
<tr><td>9</td><td>AT+NSK</td><td>AT+NSK<NSK1>…<NSK16><CR></td><td>Network Session Key</td><td>R/W</td></tr>
<tr><td>10</td><td>AT+ASK</td><td>AT+ASK<ASK1>… <ASK16><CR></td><td>Application Session Key</td><td>R/W</td></tr>
<tr><td>11</td><td>AT+AK</td><td>AT+AK<AK1>… <AK16><CR></td><td>Application Key</td><td>R/W</td></tr>
<tr><td>12</td><td>AT+SIG</td><td>AT+SIG</td><td>Get RSSI & SNR</td><td>R</td></tr>
<tr><td>13</td><td>AT+DR</td><td>AT+DR <DR><CR>
<DR>: Min 7~ Max 12</td><td>Data Rate</td><td>R/W</td></tr>
<tr><td>14</td><td>AT+POW</td><td>AT+POW <POW><CR></td><td>TX Power</td><td>R/W</td></tr>
<tr><td>15</td><td>AT+CH</td><td>AT+CH <CH><CR>
<table><tr><td>2</td><td>917.3 Mhz</td></tr><tr><td>5</td><td>917.9 Mhz</td></tr><tr><td>8</td><td>918.5 Mhz</td></tr><tr><td>11</td><td>919.1 Mhz</td></tr><tr><td>14</td><td>919.7 Mhz</td></tr><tr><td>17</td><td>920.3 Mhz</td></tr><tr><td>19</td><td>920.7 Mhz</td></tr><tr><td>20</td><td>920.9 Mhz</td></tr><tr><td>21</td><td>921.1 Mhz</td></tr><tr><td>22</td><td>921.3 Mhz</td></tr><tr><td>23</td><td>921.5 Mhz</td></tr><tr><td>24</td><td>921.7 Mhz</td></tr><tr><td>25</td><td>921.9 Mhz</td></tr><tr><td>26</td><td>922.1 Mhz</td></tr><tr><td>27</td><td>922.3 Mhz</td></tr><tr><td>28</td><td>922.5 Mhz</td></tr><tr><td>29</td><td>922.7 Mhz</td></tr><tr><td>30</td><td>922.9 Mhz</td></tr><tr><td>31</td><td>923.1 Mhz</td></tr><tr><td>32</td><td>923.3 Mhz</td></tr></table></td><td>Channel(Frequency)</td><td>R/W</td></tr>
<tr><td>16</td><td>AT+RCNT</td><td>AT+RCNT<CR></td><td><TBD>RetransmissionNumber</td><td>R/W</td></tr>
<tr><td>17</td><td>AT+ADR</td><td>AT+ADR <FLAG><CR>
<FLAG>0:Disable 1:Enable</td><td>Adaptive Data Rate</td><td>R/W</td></tr>
<tr><td>18</td><td>AT+SEND</td><td>AT+RCNT<CR></td><td><TBD> Send packet</td><td>W</td></tr>
<tr><td>19</td><td>AT+WUT</td><td>AT+WUT<CR></td><td><TBD>Wake-Up Time</td><td>R/W</td></tr>
<tr><td>20</td><td>AT+OTA</td><td>AT+OTA <FLAG><CR>
<FLAG>0:Disable 1:Enable</td><td>Over the Activation</td><td>R/W</td></tr>
<tr><td>21</td><td>AT+SKT</td><td>AT+SKT<CR></td><td><TBD>
Enable/Disable Provisioning</td><td>R/W</td></tr>
</table>

22	AT+CFM	AT+CFM<CR>	<TBD> Enable/Disable Confirm Message	R/W
23	AT+CLS	AT+CLS <CLS><CR> <CLS> : A – CLASS A B – CLASS B C – CLASS C	Configure Class A,B,C	R/W
24	AT+LOG	AT+LOG<CR>	<TBD>	R/W

4 AT Command List

4.1 General Commands

4.1.1 Check Serial Connection

Item	Description
Description	Check the status of serial connection
Command	AT
Argument	None
Response	Serial Connection OK<CR><LF>
Example	

4.1.2 Reset the Module

Item	Description
Description	Reset the module
Command	AT+RST<CR>
Argument	None
Response	RESET OK<CR><LF>
Example	AT_RST<CR> RESET OK<CR><LF>

4.1.3 Enable/Disable ECHO[TBD]

Item	Description
Description	It is used for responding message.
Command	AT+ECHO<CR>
Argument	None
Response	-
Example	-

4.1.4 Set Configuration [TBD]

Item	Description
Description	Set configuration
Command	AT+SCFG<CR>
Argument	None
Response	-
Example	-

4.1.5 Factory Reset [TBD]

Item	Description
Description	After sending Factory Reset, all of parameter will be initialized.
Command	AT+FRST<CR>
Argument	None
Response	-
Example	-

4.1.6 Get Configuration

Item	Description
Description	It is used for checking all of configuration parameter currently.
Command	AT+VCFG
Argument	None
Response	VIEW CURRENT CONFIGURATION - Application EUI : <AEUI1> <AEUI2> … <AEUI7> <AEUI8><CR><LF> - Device EUI : <EUI1> <EUI2> … <EUI7> <EUI8><CR><LF> - Device MAC Address : <MAC1><MAC2><MAC3><MAC4><CR><LF> - Network Session Key : <NSK1> <NSK2> … <NSK15> <NSK16><CR><LF> - Application Session Key : <ASK1> <ASK2> … <ASK15> <ASK16><CR><LF> - Application Key : <AK1> <AK2> … <AK15> <AK16><CR><LF> - …
Example	

4.2 Network Command

4.2.1 Device EUI

Item	Description
Description	It is for changing or checking the device EUI64 address.
Command	AT+EUI <EUI1> <EUI2> … <EUI7> <EUI8><CR>
Argument	<EUIn> : 8-th byte of Device EUI (Hex value)
Response	SET/GET DEVICE EUI - Device EUI : <EUI1> <EUI2> … <EUI7> <EUI8><CR><LF>
Example	Case 1. No Arguments AT+EUI<CR> GET DEVICE EUI<CR><LF> - Device EUI : 11 22 33 44 55 66 77 88<CR><LF> Case 2. Input Arguments AT+EUI 77 66 55 44 33 22 11 00<CR> SET DEVICE EUI <CR><LF> - Device EUI : 77 66 55 44 33 22 11 00<CR><LF> Case 3. Wrong Arguments AT+EUI ff ee dd<CR> SET DEVICE EUI <CR><LF> - ERROR, Invalid Arguments<CR><LF>

4.2.2 Device Address

Item	Description
Description	It is for changing or checking the device address.
Command	AT+MAC <DevAddr1> < DevAddr2> < DevAddr3> < DevAddr4><CR>
Argument	<MACn> : 4-th byte of Device Mac Address (Hex value)
Response	SET/GET DEVICE ADDRESS - Device Mac Address : < DevAddr 1>< DevAddr 2>< DevAddr 3>< DevAddr 4><CR><LF>
Example	Case 1. No Arguments AT+MAC<CR> GET DEVICE MAC ADDRESS<CR><LF> - Device Mac Address : 11223344 <CR><LF> Case 2. Input Arguments AT+MAC 33 22 11 00<CR> SET DEVICE MAC ADDRESS <CR><LF> - Device Mac Address : 33221100<CR><LF> Case 3. Wrong Arguments AT+MAC ff ee dd<CR> SET DEVICE MAC ADDRESS <CR><LF> - ERROR, Invalid Arguments<CR><LF>

4.2.3 Network Session Key

Item	Description
Description	It is for changing or checking the Network Session Key.
Command	AT+NSK <NSK1> <NSK2> … <NSK15> <NSK16><CR>
Argument	<NSKn> : n-th byte of Network Session Key (Hex value)
Response	SET/GET NETWORK SESSION KEY - Network Session Key : <NSK1> <NSK2> … <NSK15> <NSK16><CR><LF>
Example	Case 1. No Arguments AT+NSK<CR> GET NETWORK SESSION KEY<CR><LF> - Network Session Key : 11 22 33 44 55 66 77 88 99 aa bb cc dd ee ff 00<CR><LF> Case 2. Input Arguments AT+NSK ff ee dd cc bb aa 99 88 77 66 55 44 33 22 11 00<CR> SET NETWORK SESSION KEY<CR><LF> - Network Session Key : ff ee dd cc bb aa 99 88 77 66 55 44 33 22 11 00<CR><LF> Case 3. Wrong Arguments AT+NSK ff ee dd<CR> SET NETWORK SESSION KEY<CR><LF> - ERROR, Invalid Arguments<CR><LF>

4.2.4 Application Session Key

Item	Description
Description	It is for changing or checking the Application Session Key.
Command	AT+ASK <ASK1> <ASK2> … <ASK15> <ASK16><CR>
Argument	<ASKn> : n-th byte of application Session Key (Hex value)
Response	SET/GET APPLICATION SESSION KEY - Application Session Key : <ASK1> <ASK2> … <ASK15> <ASK16><CR><LF>
Example	Case 1. No Arguments AT+ASK<CR> GET APPLICATION SESSION KEY<CR><LF> - Application Session Key : 11 22 33 44 55 66 77 88 99 aa bb cc dd ee ff 00<CR><LF> Case 2. Input Argument AT+ASK ff ee dd cc bb aa 99 88 77 66 55 44 33 22 11 00<CR> SET APPLICATION SESSION KEY<CR><LF> - Application Session Key : ff ee dd cc bb aa 99 88 77 66 55 44 33 22 11 00<CR><LF> Case 3. Wrong Arguments AT+ASK ff ee dd<CR> SET APPLICATION SESSION KEY<CR><LF> - ERROR, Invalid Arguments<CR><LF>

4.2.5 Application Key

Item	Description
Description	It is for changing or checking the Application Key.
Command	AT+AK <AK1> <AK2> … <AK15> <AK16><CR>
Argument	<AKn> : n-th byte of application Key (Hex value)
Response	SET/GET APPLICATION KEY - Application Key : <AK1> <AK2> … <AK15> <AK16><CR><LF>
Example	Case 1. No Arguments AT+AK<CR> GET APPLICATION KEY<CR><LF> - Application Key : 11 22 33 44 55 66 77 88 99 aa bb cc dd ee ff 00<CR><LF> Case 2. Input Arguments AT+AK ff ee dd cc bb aa 99 88 77 66 55 44 33 22 11 00<CR> SET APPLICATION KEY<CR><LF> - Application Key : ff ee dd cc bb aa 99 88 77 66 55 44 33 22 11 00<CR><LF> Case 3. Wrong Arguments AT+AK ff ee dd<CR> SET APPLICATION KEY<CR><LF> - ERROR, Invalid Arguments<CR><LF>

4.2.6 Get the Latest RSSI & SNR

Item	Description
Description	It is for getting the latest RSSI & SNR from module.
Command	AT+SIG
Argument	None
Response	Latest RF Signal : <RSSI> <SNR>
Example	AT+SIG<CR> Latest RF Signal : <RSSI> <SNR><CR><LF>

4.2.7 Set/Get Data Rate

Item	Description
Description	This command is used to view the latest SNR value from latest
Command	AT+DR <DR><CR>
Argument	<DR> : 1 byte of Tx Data Rate (Hex value) min : 7, Max : 12
Response	SET/GET TX DATA RATE - Data Rate : <DR><CR><LF>
Example	Case 1. No Arguments AT+DR<CR> GET TX DATA RATE<CR><LF> - Data Rate : 8<CR><LF> Case 2. Input Arguments AT+DR 12<CR> SET TX DATA RATE <CR><LF> - Data Rate : 12<CR><LF> Case 3. Wrong Arguments AT+DR 6<CR> SET TX DATA RATE <CR><LF> - ERROR, Invalid Arguments<CR><LF>

4.2.8 Set/Get TX Power

Item	Description
Description	This command is used to view the latest SNR value from latest
Command	AT+POW <POW><CR>
Argument	<POW> : 1 byte of Tx Power (Hex value) min : 0, Max : 20
Response	SET/GET TX POWER - TX Power : <POW> dBm<CR><LF>
Example	Case 1. No Arguments AT+POW<CR> GET TX POWER<CR><LF> - Tx Power : 8 dBm<CR><LF> Case 2. Input Argument AT+POW 12<CR> SET TX POWER <CR><LF> - Tx Power : 12 dBm<CR><LF> Case 3. Wrong Arguments AT+POW 30<CR> SET TX POWER <CR><LF> - ERROR, Invalid Arguments<CR><LF>

4.2.9 Set/Get Channel

Item	Description
Description	It is for getting or setting channel
Command	AT+CH <CH><CR>
Argument	<CH> : 1 byte of Tx Channel (Hex value) Channel List : - 2, 5, 8, 11, 14, 17, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32
Response	SET/GET TX CHANNEL - Tx Channel : <CH><CR><LF>
Example	Case 1. No Arguments AT+CH<CR> GET TX CHANNEL<CR><LF> - Tx Channel : 922100000<CR><LF> Case 2. Input Argument AT+CH 17<CR> SET TX CHANNEL<CR><LF> - Tx Channel : 920300000<CR><LF> Case 3. Wrong Arguments AT+CH 1<CR> SET TX CHANNEL<CR><LF> - ERROR, Invalid Arguments<CR><LF>

4.2.10 Enable/Disable Adaptive Data Rate

Item	Description
Description	Enable or Disable Adaptive Data Rate, and then default value is disable.
Command	AT+ADR <FLAG><CR>
Argument	<FLAG> : 0 – Disable, 1 – Enable
Response	SET/GET ADAPTIVE DATA RATE FLAG - Over The Air Activation : Enable/Disable<CR><LF>
Example	Case 1. No Arguments AT+ADR<CR> GET ADAPTIVE DATA RATE FLAG<CR><LF> - Adaptive Data Rate Flag : Disable Case 2. Input Argument AT+ ADR 1<CR> SET ADAPTIVE DATA RATE FLAG <CR><LF> - Adaptive Data Rate Flag : Enable Case 3. Wrong Arguments AT+ ADR C D<CR> SET ADAPTIVE DATA RATE FLAG <CR><LF> - ERROR, Invalid Arguments<CR><LF>

4.2.11 TX Retransmission Number [TBD]

Item	Description
Description	It is for changing tx retransmission number.
Command	AT+RCNT<CR>
Argument	None
Response	-
Example	-

4.2.12 Send Packet [TBD]

Item	Description
Description	It is using for sending the user defined packet
Command	AT+SEND<CR>
Argument	None
Response	-
Example	-

4.3 Additional Command

4.3.1 Wakeup Time [TBD]

Item	Description
Description	Get or set wake-up time
Command	AT+WUT<CR>
Argument	None
Response	-
Example	-

4.3.2 Enable/Disable Over The Air Activation

Item	Description
Description	Enable or disable over the activation (default : disable)
Command	AT+OTA <FLAG><CR>
Argument	<FLAG> : 0 – Disable , 1 – Enable
Response	SET/GET OTA FLAG - Over The Air Activation : Enable/Disable<CR><LF>
Example	Case 1. No Arguments AT+OTA<CR> GET OTA FLAG<CR><LF> - Over The Air Activation : Disable Case 2. Input Argument AT+OTA 1<CR> SET OTA FLAG <CR><LF> - Over The Air Activation : Enable Case 3. Wrong Arguments AT+OTA C D<CR> SET OTA FLAG <CR><LF> - ERROR, Invalid Arguments<CR><LF>

4.3.3 Enable/Disable Provisioning [TBD]

Item	Description
Description	Enable or disable SKT Provision
Command	AT+SKT<CR>
Argument	None
Response	-
Example	-

4.3.4 Enable/Disable Confirm Message [TBD]

Item	Description
Description	Enable or disable Confirm Message
Command	AT+CFM<CR>
Argument	None
Response	-
Example	-

4.3.5 Get/Set Class

Item	Description
Description	Get or set class type according to "LoRaWAN Specificatin R 1.0.1"
Command	AT+CLS <CLS><CR>
Argument	<CLS> : A – CLASS A, B – CLASS B, C – CLASS C
Response	SET/GET CLASS - Class : <CLS><CR><LF>
Example	Case 1. No Arguments AT+CLS<CR> GET CLASS<CR><LF> - Class : A Case 2. Input Argument AT+CLS C<CR> SET CLASS<CR><LF> - Class : C Case 3. Wrong Arguments AT+CLS C D<CR> SET CLASS<CR><LF> - ERROR, Invalid Arguments<CR><LF> Case 4. Wrong Arguments AT+CLS B<CR> SET CLASS<CR><LF> - Not Supported<CR><LF>

4.3.6 Enable/Disable Log Message [TBD]

Item	Description
Description	This command is used to Set Enable/Disable Log Message
Command	AT+LOG<CR>
Argument	None
Response	-
Example	-

5 Appendix

5.1 Channel

No	Channel	Frequency
1	2	917.3 Mhz
2	5	917.9 Mhz
3	8	918.5 Mhz
4	11	919.1 Mhz
5	14	919.7 Mhz
6	17	920.3 Mhz
7	19	920.7 Mhz
8	20	920.9 Mhz
9	21	921.1 Mhz
10	22	921.3 Mhz
11	23	921.5 Mhz
12	24	921.7 Mhz
13	25	921.9 Mhz
14	26	922.1 Mhz
15	27	922.3 Mhz
16	28	922.5 Mhz
17	29	922.7 Mhz
18	30	922.9 Mhz
19	31	923.1 Mhz
20	32	923.3 Mhz