RAK7431 AT Command Manual

Overview

This document applies to Modbus RS485 to LoRaWAN® Bridge products. The supported product models include RAK7421 / RAK7431 / RAK7425.

AT Command Syntax

In general, the AT Command for the RAK7431 start with `AT` or `at` and ends with `<CR> <LF>`.

- AT commands can be divided into:
  - **Reading commands** - read the configuration or status of the device, which is in the format of: `AT+<x>`
  - **Write commands** - write/modify the device configuration, which is in the format of: `AT+<x>=<m>:<n>` The command name and parameters are separated by "**=**". If there are multiple parameters, the parameters are separated by "**:**"
  - **Test commands** - is the test command executable, which is in the format of: `AT+<x>=?`

Condition	Response
Normal response with information	`<Response><CR><LF>OK<CR><LF>`
Normal response	`OK<CR><LF>`
Response when an error occurs	`ERROR <Error code>:<Error packet><CR><LF>`

> 📝 **NOTE**
>
> AT commands are not case sensitive.

USB Configuration Interface

The devices are equipped with a standard USB interface for configuring the AT commands. The serial parameters are as follows:

Parameter	Value
Baud rate	115200
Data bit	8
Stop bit	1
Verification	No

Common Errors

Error Code	Description
ERROR 1	Unsupported command
ERROR 2	Syntax error
ERROR 3	Storage failure
ERROR 4	System busy
ERROR 5	Parameter format / number error
ERROR 6	Insufficient resources
ERROR 7	Parameter out of valid range

LoRaWAN Commands

1. **AT+DEVEUI**

This command reads or modifies the LoRaWAN Device EUI. The command takes effect after restart.

Operation	AT Command	Response
Read	`AT+DEVEUI`	`<dev_eui>` `OK`

Write	`AT+DEVEUI=<device_eui>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<packet>`

Test	`AT+DEVEUI=?`	`OK`

Parameter	Information
dev_eui	**Device EUI**:Hexadecimal characters, 16 bytes in length

2. **AT+REGION**

This command reads or modifies the Working Frequency Region/Band of the device. It will take effect after restart.

Operation	AT Command	Response
Read	`AT+REGION`	`<region>` `OK`

Write	`AT+REGION=<region>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<packet>`

Test	`AT+REGION=?`	`OK`

Parameter	Information
region	**Supports frequency bands:** EU433, CN470, CN470ALI, RU864, IN865, EU868, US915, AU915, KR920, AS923

3. AT+JOINMODE

This command reads or modifies the LoRaWAN Activation Mode of the device. It will take effect after restart.

Operation	AT Command	Response
Read	`AT+JOINMODE`	`<mode>` `OK`

Write	`AT+JOINMODE=<mode>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<packet>`

Test	`AT+JOINMODE=?`	`OK`

Parameter	Information
mode	**Supported activation mode:** ABP or OTAA

4. AT+PUBLIC

This command reads or modifies the LoRaWAN Public Settings of the device. The working mode is set to Public by default (1 value of the parameter). The modification will take effect after restart.

Operation	AT Command	Response
Read	`AT+PUBLIC`	`<x>` `OK`

Write	`AT+PUBLIC=<x>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<packet>`

Test	`AT+PUBLIC=?`	`OK`

Parameter	Information
x	**Is the node working with public LoRaWAN network?**
0	Not working in Public mode
1	Working in Public mode

5. **AT+CLASS**

This command reads or modifies the LoRaWAN working Class of the device. Effective immediately after modification.

Operation	AT Command	Response
Read	`AT+CLASS`	`<class>` `OK`

Write	`AT+CLASS=<class>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<packet>`

Test	`AT+CLASS=?`	`OK`

Parameter	Information
class	**Supported device Classes:**
A	Class A
B	Class B
C	Class C

6. **AT+APPEUI**

The APPEUI parameter is valid when OTAA is activated. The modification will take effect after restart.

Operation	AT Command	Response
Read	`AT+APPEUI`	`<app_eui>` `OK`

Write	`AT+APPEUI=<app_eui>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<packet>`

Test	`AT+APPEUI=?`	`OK`

Parameter	Information
app_eui	**Application EUI:** Hexadecimal character, 16 bytes in length

7. AT+APPKEY

The APPKEY parameter is valid in OTAA Activation Mode. The modification will take effect after restart.

Operation	AT Command	Response
Read	`AT+APPKEY`	`<app_key>` `OK`

Write	`AT+APPKEY=<app_key>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<packet>`

Test	`AT+APPKEY=?`	`OK`

Parameter	Information
app_key	**Application Key:** Hexadecimal character, 32 bytes in length

8. AT+DEVADDR

The DEVADDR parameter is valid in ABP Activation Mode. The modification will take effect after restart.

Operation	AT Command	Response
Read	`AT+DEVADDR`	`<dev_addr>` `OK`

Write	`AT+DEVADDR=<dev_addr>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<packet>`

Test	`AT+DEVADDR=?`	`OK`

Parameter	Information
dev_addr	**Device Address:** Hexadecimal character, 8 bytes in length

9. AT+APPSKEY

The APPSKEY parameter is valid in ABP Activation Mode. The modification will take effect after restart.

Operation	AT Command	Response
Read	`AT+APPSKEY`	`<apps_key>` `OK`

Write	`AT+APPSKEY=<apps_key>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<packet>`

Test	`AT+APPSKEY=?`	`OK`

Parameter	Information
apps_key	**Application Session Key:** Hexadecimal character, 32 bytes in length

10. **AT+NWKSKEY**

The NWKSKEY parameter is valid in ABP Activation Mode. The modification will take effect after restart.

Operation	AT Command	Response
Read	`AT+NWKSKEY`	`<nwks_key>` `OK`

Write	`AT+NWKSKEY=<nwkskey>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<packet>`

Test	`AT+NWKSKEY=?`	`OK`

Parameter	Information
nwks_key	**Network Session Key:** Hexadecimal character, 32 bytes in length

11. **AT+ADR**

Turn on/off the LoRaWAN dynamic rate adjustment function of the device, which is “on” by default. The modification will take effect immediately.

Operation	AT Command	Response
Read	`AT+ADR`	`<n>` `OK`

Write	`AT+ADR=<n>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<packet>`

Test	`AT+ADR=?`	`OK`

Parameter	Information
n	**Adaptive Data Rate**
0	Disable ADR
1	Enable ADR

12. **AT+DATARATE**

Read/modify the LoRaWAN DataRate setting of the device, which is valid when the ADR function is turned off. The modification will take effect immediately.

Operation	AT Command	Response
Read	`AT+DATARATE`	`<n>` `OK`

Write	`AT+DATARATE=<n>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<packet>`

Test	`AT+DATARATE=?`	`OK`

Parameter	Information
n	**LoRaWAN DataRate**
0 ~ 7	DataRate from 0 to 7s is possible.

> 📝 **NOTE**
>
> The DataRate value and the default value are related to LoRaWAN regional parameters. Refer to Appendix I: DataRate list of each region in this document.

13. **AT+CONFIRM**

Turn on/off the LoRaWAN packet confirmation mechanic, which is set to be “on” by default. The modification will take effect immediately.

When the confirm function is enabled, the packets sent by the device will require the LoRa network server to send an ACK response. Unless a confirmation is received the device will resend the packet. For more information on the resending mechanic refer to “**14. AT+RETRY**”.

Operation	AT Command	Response
Read	`AT+CONFIRM`	`<n>` `OK`

Write	`AT+CONFIRM=<n>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<packet>`

Test	`AT+CONFIRM=?`	`OK`

Parameter	Information
n	**Type of uplink packets**
0	Unconfirmed uplink packets
1	Confirmed uplink packets

14. **AT+RETRY**

Set the maximum number of retry attempts of the same LoRaWAN message, that will be valid when the confirm function is enabled. The default value is 3. The modification will take effect immediately.

When retry = n (n! = 1), if the device does not receive an ACK of a LoRaWAN message, it will resend the message until the ACK is received, or the retry counter expires.

Operation	AT Command	Response
Read	`AT+RETRY`	`<n>` `OK`

Write	`AT+RETRY=<n>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<packet>`

Test	`AT+RETRY=?`	`OK`

Parameter	Information
n	**Max resend times**
1 ~ 8	The number of retries can be between 1 and 8

15. **AT+CHANNEL**

When the LoRaWAN channel plan of the device is CN470 / US915 / AU915, it can be read/modified through this instruction. After execution of this command, all channels from “start ID” to “end ID” in the instruction parameters are turned on, and the other channels are turned off. The modification will take effect after restart.

When the device is working in one of the following bands this command can only be used for reading the parameters: EU433 / RU864 / IN865 / EU868 / KR920 / AS923.

Operation	AT Command	Response

Read	`AT+CHANNEL`	`<id>:<freq>:<drmin>:<drmax>`
		...
		`OK`

Write
(Only valid when Region is CN470 / US915 / AU915)
	`AT+CHANNEL=<startid>:<endid>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<packet>`

Test	`AT+CHANNEL=?`	`OK`

Parameter	Information
id	Channel ID
freq	Center frequency of channel, unit: Hz
drmin	DataRate (Min)
drmax	DataRate (Max)
startid	Start channel ID
endid	Stop channel ID

16. **AT+ADDCHANNEL**

Add a LoRaWAN channel.

This instruction is valid when the working frequency band of LoRaWAN is EU433 / RU864 / EU868 / KR920 / AS923. The modification will take effect after restart.

Operation	AT Command	Response

Write	`AT+ADDCHANNEL=<freq>:<drmin>:<drmax>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<packet>`

Test	`AT+ADDCHANNEL=?`	`OK`

Parameter	Information
freq	Center frequency of channel, unit: Hz
drmin	DataRate (Min)
drmax	DataRate (Max)

17. **AT+RMCHANNEL**

Delete a LoRaWAN channel.

This instruction is valid when the working frequency band is EU433 / RU864 / EU868 / KR920 / AS923. The modification takes effect after restart.

Operation	AT Command	Response

Write	`AT+RMCHANNEL=<freq>:<drmin>:<drmax>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<packet>`

Test	`AT+RMCHANNEL=?`	`OK`

Parameter	Information
freq	Center frequency of channel, unit: Hz
drmin	DataRate (Min)
drmax	DataRate (Max)

18. **AT+CHANMASK**

Read the currently configured LoRaWAN Channel Mask. It is determined by the currently open channels. This instruction is “read-only”.

Operation	AT Command	Response
Read	`AT+CHANMASK`	`<chanmsk>` `OK`
Test	`AT+CHANMASK=?`	`OK`

Parameter	Information
chanmask	**Channel mask:** Hexadecimal string, right to left corresponding channel ID from low to high

19. **AT+TXPOWER**

The TXPOWER parameter is valid when the ADR function is turned off. The modification will take effect immediately.

Operation	AT Command	Response
Read	`AT+TXPOWER`	`<txpwr>` `OK`

Write	`AT+TXPOWER=<txpwr>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<packet>`

Test	`AT+TXPOWER=?`	`OK`

Parameter	Information
txpwr	Transmit power (dBm, floating-point) The value range is 0 ~ maxeirp, and the effective step size is 2dbm, that is, txpwr = maxeirp – 2 * n, and n is an integer greater than or equal to 0 The maxeirp is the Maximum EIRP (Equivalent Isotropic Radiated Power) defined for the specific band you are using in the LoRa Alliance documentation.

20. **AT+PINGNB**

Set the PingSlot Number in each Beacon Period for Class B mode. The number of ping slots determines the period of the downlink packet of the device. The modification will take effect after restart.

Operation	AT Command	Response
Read	`AT+PINGNB`	`<N>` `OK`

Write	`AT+PINGNB=<N>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<message>`

Test	`AT+PINGNB=?`	`OK`

Parameter	Information
N	PingSlot Number in Beacon Period 1 2 4 8 16 32 64 128

21. **AT+LPTP**

LoRa Private Transport Protocol (LPTP) is a RAK proprietary message splitting protocol, which can send data with a length exceeding the maximum permissible size, using multiple messages. As it is proprietary it only works with the RAK LoRa networks server built-into our commercial gateways. It is “Off” by default. The modification will take effect immediately.

Operation	AT Command	Response
Read	`AT+LPTP`	`<x>` `OK`

Write	`AT+LPTP=<x>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<packet>`

Test	`AT+LPTP=?`	`OK`

Parameter	Information
x	**LPTP status**
0	disabled
1	enabled

Data Interface Commands

1. **AT+BAUDRATE**

The command is used to read or modify the baud rate of the device's data serial port. The modification will take affect after restarting.

Operation	AT Command	Response
Read	`AT+BAUDRATE`	`<baudrate>` `OK`

Write	`AT+BAUDRATE=<baudrate>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<message>`

Test	`AT+BAUDRATE=?`	`OK`

Parameter	Information
baudrate	Baud rate of serial port data: 2400 4800 9600 14400 19200 38400 57600 115200

2. AT+DATABIT

Read or modify the data bit of the serial data. The modification will take effect after restart.

Operation	AT Command	Response
Read	`AT+DATABIT`	`<databit>` `OK`

Write	`AT+DATABIT=<databit>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<message>`

Test	`AT+DATABIT=?`	`OK`

Parameter	Information
databit	**Data bit of serial port data:**
7	7th bit
8	8th bit

3. AT+STOPBIT

Read or modify the serial port data stop bit. The modification will take effect after restart.

Operation	AT Command	Response
Read	`AT+STOPBIT`	`<stopbit>` `OK`

Write	`Write AT+STOPBIT=<stopbit>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<message>`

Test	`AT+STOPBIT=?`	`OK`

Parameter	Information
stopbit	**Serial stop bit:**
1	1bit
1.5	1.5bits
2	2bits

4. **AT+PARITY**

Read or modify the parity check bit of the data. The modification will take effect after restart.

Operation	AT Command	Response
Read	`AT+PARITY`	`<parity>` `OK`

Write	`AT+PARITY=<parity>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<message>`

Test	`AT+PARITY=?`	`OK`

Parameter	Information
parity	**Parity check:**
NONE	No check
EVEN	Even parity check
ODD	Odd parity check

5. **AT+DTUMODE**

Read or modify the operating mode of the device's data interface. The data interface supports two modes: P2P and MODBUS. The modification will take effect immediately.

Operation	AT Command	Response
Read	`AT+DTUMODE`	`<mode>` `OK`

Write	`AT+DTUMODE=<mode>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<message>`

Test	`AT+DTUMODE=?`	`OK`

Parameter	Information
mode	**Operating mode:**
P2P	Point to point mode
MODBUS	Modbus mode

6. AT+MODBUSTIMEOUT

Read or modify the Modbus instruction timeout of the device. It is valid when the data interface is in MODBUS Mode. The modification will take effect immediately.

Operation	AT Command	Response
Read	`AT+MODBUSTIMEOUT`	`<n>` `OK`

Write	`AT+MODBUSTIMEOUT=<n>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<message>`

Test	`AT+MODBUSTIMEOUT=?`	`OK`

Parameter	Information
n	Modbus timeout in ms

7. AT+TRANSPARENT

When the serial data port of the device works in MODBUS mode, the data encapsulation format can be divided into two types: transparent transmission mode and non-transparent transmission mode.

In transparent mode, the Modbus execution instruction response data (data, received by the node) will be directly forwarded through LoRaWAN network.

In the non-transparent mode, the Modbus execution instruction response data (data, received by the node) will be encapsulated in the message header according to the Modbus protocol, and then transmitted to the server through LoRaWAN. Please refer to “**Appendix II: MODBUS Data Encapsulation Protocol**” for details.

Non-transparent mode is the default one. The modification will take effect immediately.

Operation	AT Command	Response
Read	`AT+TRANSPARENT`	`<n>` `OK`

Write	`AT+TRANSPARENT=<n>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<message>`

Test	`AT+TRANSPARENT=?`	`OK`

Parameter	Information
n	**Operating mode:**
0	non-transparent mode
1	transparent mode

8. AT+MODBUSRETRY

When the device works in MODBUS mode, with this command the number of retries, when a MODBUS instruction does not get response, is specified. By default, there is no retransmission value added. The modification will take effect immediately.

Operation	AT Command	Response
Read	`AT+MODBUSRETRY`	`<n>` `OK`

Write	`AT+MODBUSRETRY=<n>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<message>`

Test	`AT+MODBUSRETRY=?`	`OK`

Parameter	Information
n	**Number of retries:**
0	No retry
1 ~ 8	1 ~ 8 retries

9. AT+ENABLEPOLL

When the device works in MODBUS mode, it supports the timed polling function.

This means that the device will perform a polling operation every given period (polling cycle). During polling, the device will send the pre-added MODBUS instructions in turn and forward the corresponding response data through

the LoRaWAN network.

The device turns on timed polling by default. The modification shall take effect after restart.

Operation	AT Command	Response
Read	`AT+ENABLEPOLL`	`<n>` `OK`

Write	`AT+ENABLEPOLL=<n>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<message>`

Test	`AT+ENABLEPOLL=?`	`OK`

Parameter	Information
n	**Scheduled polling status:**
0	Disabled
1	Enabled

10. **AT+POLLPERIOD**

This command sets/reads the scheduled polling cycle. This command only works if scheduled polling is enabled. The modification takes effect after the next polling cycle or a restart.

Operation	AT Command	Response
Read	`AT+POLLPERIOD`	`<n>` `OK`

Write	`AT+POLLPERIOD=<n>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<message>`

Test	`AT+POLLPERIOD=?`	`OK`

Parameter	Information
n	**Polling cycle in seconds**

11. **AT+ADDPOLL**

Add a polling instruction with this command. Up to 32 polling instructions are supported. The modification takes effect after the next polling cycle or a restart.

Operation	AT Command	Response

Write	`AT+ADDPOLL=<n>:<xxxx>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<message>`

Test	`AT+ADDPOLL=?`	`OK`

Parameter	Information
n	**Polling instruction ID, value range 1 ~ 127**
xxxx	Polling instruction content, hexadecimal string, maximum instruction length 128 bytes

12. **AT+RMPOLL**

Delete a polling instruction. The modification takes effect after the next polling cycle or a restart

Operation	AT Command	Response

Write	`AT+RMPOLL=<n>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<message>`

Test	`AT+RMPOLL=?`	`OK`

Parameter	Information
n	**Polling instruction ID, value range 1 ~ 127**

13. **AT+POLLTASK**

Query the list of scheduled polling instructions.

Operation	AT Command	Response

Write	`AT+POLLTASK`	When it is successful:
		`<n>:<xxxx>`
		...
		`OK`
		When modification fails:
		`ERROR <code>:<message>`

Test	`AT+POLLTASK=?`	`OK`

Parameter	Information
n	Polling instruction ID, value range 1 ~ 127
xxxx	Instruction content, hexadecimal string

14. **AT+ADDSCHEDULETASK**

Schedule an instruction. The modification takes effect immediately after setting. The time in the command is local time.

Operation	AT Command	Response

Write	`AT+ADDSCHEDULETASK=<id>:<type>:<w>:<h>:<m>:<s>:<data>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<message>`

Test	`AT+ADDSCHEDULETASK =?`	`OK`

Parameter	Information
id	Task ID，value is： 1 ~ 127
type	the type of schedule task: **WEEK** - once a week **DAY** - once a day **HOUR** - once an hour*
w	WEEK, only need add the value when the type = WEEK; 0 - For Sunday 1 ~ 6 For Monday ~ Saturday
h	Hour: 0 ~ 23
m	Minute： 0 ~ 59
s	Second： 0 ~ 59

> 📝 **NOTE**
>
> *If selected type is HOUR, the parameter `<h>` is not used from the system.

15. **AT+RMSCHEDULETASK**

A command to delete a scheduled instruction. The modification takes effect immediately after setting.

Operation	AT Command	Response

Write	`AT+RMSCHEDULETASK=<n>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<message>`

Test	`AT+RMSCHEDULETASK=?`	`OK`

Parameter	Information
n	Task ID，value is: 1 ~ 127

System Related Commands

1. **AT+TIMEZONE**

With this command, the time zone of the device is set.

Operation	AT Command	Response
Read	`AT+TIMEZONE`	`<TZ>` `OK`

Write	`AT+TIMEZONE=<TZ>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<message>`

Test	`AT+TIMEZONE=?`	`OK`

Parameter	Information
TZ	UTC time zone: -12 ~ 12

2. **AT+VERSION**

Read the firmware version of the device.

Operation	AT Command	Response
Read	`AT+VERSION`	When the modification is successful: ` <a>.<b>.<cccc>` `OK` When modification fails: `ERROR <code>:<packet>`

Parameter	Information
a.b.cccc	Firmware Version, for example “1.1.0050”

3. **AT+SYSLOGLVL**

Read or set the system log level. The module turns off the system log output by default. The user can modify the log output level through this command. The modification takes effect immediately after setting.

Operation	AT Command	Response
Read	`AT+SYSLOGLVL`	`<TZ>` `OK`
Write	`AT+SYSLOGLVL=<level>`	`OK`
Test	`AT+SYSLOGLVL=?`	`OK`

Parameter	Information
level	**Output log level**
0	does not output any logs
1 ~ 6	log with output level less than or equal to the value

4. **AT+ECHO**

Turns local echo of the AT command-line interface on/off. Echo is turned off by default. It takes effect immediately after modification and is automatically turned off after a restart.

Operation	AT Command	Response

Write	`AT+ECHO=<n>`	When the modification is successful:
		`OK`
		When modification fails:
		`ERROR <code>:<packet>`

Parameter	Information
n	**Local echo**
0	Disabled
1	Enabled

5. **AT+BOOT**

The device supports switching to boot mode. In boot mode, the dedicated upgrade software can be used for firmware update.

Operation	AT Command	Response
Write	`AT+BOOT`	`<BOOT MODE>`

6. **AT+RESTART** Reboot the device.

Operation	AT Command	Response
Write	`AT+RESTART`	`Null`

7. **AT+FACTORY**

The command restores the device to the factory settings. This operation will last for about 60s. Do not cut off the power supply of the device before it automatically restarts.

Operation	AT Command	Response
Write	`AT+FACTORY`	`Null`

8. **AT+SYSTIME**

Show the real running time.

Operation	AT Command	Response
Write	`AT+SYSTIME`	`<time>` `OK`

Parameter	Information
time	Timestamp in UNIX format, in seconds

9. **AT+DATETIME**

Show the synchronized with the LoRaWAN Network Server time. Needs LoRaWAN1.0.3 specification support from the server side.

Operation	AT Command	Response
Read	`AT+DATETIME`	`<datetime>` `OK`

Parameter	Information
datetime	Date / Time in YYYY/MM/DD hh:mm:ss

10. **AT+SYSINFO**

This command gives the system information of the device.

Operation	AT Command	Response

Read	`AT+SYSINFO`	`<model>`
		`<sn>`
		`<version>`
		`<vendor>`
		`<copyright>`
		`OK`

Parameter	Information
model	Model info
sn	Product SN info
version	Firmware version
vendor	Manufacturer info
copyright	Copyright info

11. **AT+WAKEUPBYTE**

This command allows you to check or change the wake up byte.

Operation	AT Command	Response
Read	`AT+WAKEUPBYTE`	`<XX>` `<OK>`
Write	`AT+WAKEUPBYTE=<XX>`	`<OK>`

Parameter	Information
XX	Wake up byte

> 📝 **NOTE**
>
> Default value is 0xAA.

Event Notification

When the working state of the module changes, an event notification will be output through the AT command-line interface. The event notification format is:

```sh
EVENT:[EVENT_ID]:[EVENT_MSG]:<ADDITIONAL_INFO>
```

Event	Description
EVENT_ID	Event ID
EVENT_MSG	Event name
ADDITIONAL_INFO	Additional information - Optional Some events need to output additional information. Multiple additional information sets are separated by ":"

The module supports the following event notifications:

ID	EVENT_MSG	Description
0	STARTUP	System startup complete
1	JOIN_NETWORK	Successful join to the LoRaWAN network
2	LEAVE_NETWORK	Unsuccessful join to the LoRaWAN network
5	SYSTEM_WAKEUP	System wakeup
6	RESTART	System restart

1. **STARTUP Event** - Appears after system initialization.
   - **Message format**:

```sh
EVENT:0:STARTUP
No additional information.
```

2. **JOIN_NETWORK Event** - LoRaWAN network activation successful. It appears after OTAA join successful.
   - **Message format**:

```sh
EVENT:1:JOIN_NETWORK
No additional information.
```

3. **LORA_LEAVE_NETWORK Event** - In OTAA activation mode, if eight consecutive uplink confirmed packets do not receive a response, the LORA_LEAVE_NETWORK event will be triggered. After the LORA_LEAVE_NETWORK event is triggered, the module will stop sending LoRaWAN message and start OTAA activation again.
   - **Message format**:

```sh
EVENT:2:LEAVE_NETWORK
No additional information.
```

4. **SYSTEM_WAKEUP Event** - A module in a low-power state can be awaken by receiving input from the AT command line interface. After wakeup, the module will no longer enter low-power mode. If you want the module to enter low power mode again, use the command: `AT+SLEEP\r\n`
   - **Message format**:

```sh
EVENT:5:SYSTEM_WAKEUP
```

5. **RESTART Event** - Triggered before the module restarts.
   - **Message format**:

```sh
EVENT:6:RESTART
```

6. **Low Power Operation and Wakeup** -The module supports low power mode. When the device is working in Class A, it automatically enters into low power operation mode. The module can be woken up at any time, when one of the following events occurs:
   - **Wakeup on system interrupt** - When module needs to perform tasks such as sending/receiving, it will wake up automatically. Automatically returns to low power mode after the task is completed.
   - **Wakeup via the AT command-line interface** - Any instruction sent through the AT command line interface can wake up the module. After wakeup, the SYSTEM_WAKEUP event is triggered, and the low power mode is no longer entered so that the user can use the AT command line to modify the module configuration info. If you want the module to enter low power mode again, use the command: `AT+SLEEP\r\n`

LoRaWAN FPort Definition

Uplink Message FPort Definition

FPort	Message Type	Note
1 ~ 128	RS485/232 Scheduled task/poll uplink message	Fport is consistent scheduled task/poll ID
129	Non-transparent mode, reply of remote instruction message	
130	In transparent transmission mode, RS485/232 data upload message	
131 ~ 223	Reserved	not used

Downlink Message FPort Definition

FPort	Message Type	Note
1 ~ 128	Reserved	not used
129	Non-transparent mode, remote instruction	
130	RS485/232 downlink data sent remotely in transparent transmission mode	
131 ~ 119	Reserved	not used
200	Remote restart command	
201	Remote on/off ADR command	
202	Remote set working rate command	Valid when ADR is closed
203	Remote set transmit power command	Valid when ADR is closed
204	Remote on/off message acknowledgment	
205	Remote settings retransmission at this time	Valid when the confirmed message mechanism is on

Appendix I: Data Rate of Each Region

EU433/RU864/EU868/AS923

Data Rate	Configuration	Indicative physical bit rate [bit/s]
0	LoRa: SF12 / 125kHz	250
1	LoRa: SF11 / 125kHz	440
2	LoRa: SF10 / 125kHz	980
3	LoRa: SF9 / 125kHz	1760
4	LoRa: SF8 / 125kHz	3125
5	LoRa: SF7 / 125kHz	5470
6	LoRa: SF7 / 250kHz	11000
7	FSK: 50kbps	50000
8 ~ 15	RFU	

CN470/KR920

Data Rate	Configuration	Indicative physical bit rate [bit/s]
0	LoRa: SF12 / 125kHz	250
1	LoRa: SF11 / 125kHz	440
2	LoRa: SF10 / 125kHz	980
3	LoRa: SF9 / 125kHz	1760
4	LoRa: SF8 / 125kHz	3125
5	LoRa: SF7 / 125kHz	5470
6 ~ 15	RFU	

US915

Data Rate	Configuration	Indicative physical bit rate [bit/s]
0	LoRa: SF10 / 125kHz	980
1	LoRa: SF9 / 125kHz	1760
2	LoRa: SF8 / 125kHz	3125
3	LoRa: SF7 / 125kHz	5470
4	LoRa: SF8 / 500kHz	12500
5 ~ 7	RFU	
8	LoRa: SF12/500kHz	980
9	LoRa: SF11/500kHz	1760
10	LoRa: SF10/500kHz	3900
11	LoRa: SF9/500kHz	7000
12	LoRa: SF8/500kHz	12500
13	LoRa: SF7/500kHz	21900
14 ~ 15	RFU	

AU915

Data Rate	Configuration	Indicative physical bit rate [bit/s]
0	LoRa: SF12 / 125kHz	250
1	LoRa: SF11 / 125kHz	440
2	LoRa: SF10 / 125kHz	980
3	LoRa: SF9 / 125kHz	1760
4	LoRa: SF8 / 125kHz	3125
5	LoRa: SF7 / 125kHz	5470
6	LoRa: SF8/500kHz	12500
7	RFU	RFU
8	LoRa: SF12/500kHz	980
9	LoRa: SF11/500kHz	1760
10	LoRa: SF10/500kHz	3900
11	LoRa: SF9/500kHz	7000
12	LoRa: SF8/500kHz	12500

IN865

Data Rate	Configuration	Indicative physical bit rate [bit/s]
0	LoRa: SF12 / 125kHz	250
1	LoRa: SF11 / 125kHz	440
2	LoRa: SF10 / 125kHz	980
3	LoRa: SF9 / 125kHz	1760
4	LoRa: SF8 / 125kHz	3125
5	LoRa: SF7 / 125kHz	5470
6	RFU	RFU
7	FSK: 50kbps	50000
8 ~ 15	RFU	RFU

Appendix II: Modbus Data Encapsulation Protocol

This section describes the definition of the Modbus message encapsulation format.

Message Command	Message Sequence Number	Data Length	Data
DTU_CMD	MSER	MDATA_LEN	MDATA
1Byte	2Byte	2Byte	nByte

- **DTU_CMD**: Message Command (Chapter 9.1)
- **MSER**: Message Sequence Number
- **DTU report message actively** - DTU incremental cycle count.
- **Platform query message** - consistent with the sequence number of the message issued by the platform.

Message Command DTU_CMD Definition

Data Bits	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
Definition	DIR	STATUS	RESERVED	Message TYPE				
Description	0: Downlink 1: Uplink	0: Success 1: Fail	0: Reserved	0x00: Reserved 0x01: Scheduled polling task data 0x02: Transparent instruction / data 0x03: Add scheduled polling task list 0x04: Remove scheduled polling task list 0x05: Read scheduled polling task list 0x06: Read LoRa configuration 0x07: Set LoRa configuration 0x08: Read DTU configuration 0x09: Set DTU configuration 0x1D: Initialize LoRa configuration 0x1E: Initialize DTU configuration 0x1F: System restart				

> 📝 **NOTE**
>
> - **Bit7 direction**: The message sent by the platform to DTU is a downlink message. This is 0. The message sent by DTU to the platform is an uplink message. This is 1.
> - **Bit6 status**: The result of DTU executing instruction/task - 0 for success and 1 for failure.

Message Type Definition

1. **Data for Scheduled Polling Task**

The scheduled polling task list is responsible for sending the read data when the scheduled task list is executed by the platform. This message needs to be sent whether the execution is successful or not. When the execution fails, the status flag position in the DTU_CMD command is 1, and the data length is 0. When the execution is successful, the status flag position is 0 in the DTU_CMD command.

- Execution success message format:

DTU_CMD	MSER	MDATA_LEN	MDATA	
			TASK_ID	DATA
0x81	2Byte	2Byte	1Byte	nByte

- Execution failure message format:

DTU_CMD	MSER	MDATA_LEN	MDATA	
			TASK_ID	ERROR_CODE
0xC1	2Byte	2Byte	1Byte	1Byte

> 📝 **NOTE**
>
> - **TASK_ID**: Task list ID.
> - **DATA**: Data. When the scheduled task list fails to execute, the data length is 0.

2. **Transparent Instruction / Data Message**

The transparent transmission instructions and the execution results of the instructions issued by the platform are transmitted through this message.

This message needs to be sent whether or not the instruction is executed successfully. When the execution fails, the STATUS bit position in the DTU_CMD command is 1, and the data length is 0. When the execution is successful, the STATUS flag position in the DTU_CMD command is 0.

- Format of downlink instruction message:

DTU_CMD	MSER	MDATA_LEN	MDATA
0x02	2Byte	2Byte	DATA nByte

- Uplink data message format when execution successful:

DTU_CMD	MSER	MDATA_LEN	MDATA
0x82	2Byte	2Byte	DATA nByte

- Uplink data message format when execution failed:

DTU_CMD	MSER	MDATA_LEN	MDATA
0xC2	2Byte	2Byte	ERROR_CODE 1Byte

> 📝 **NOTE**
>
> - **DATA**: Instruction content / data
> - **ERROR_CODE**: Error code

3. **Add Scheduled Polling Task List message**

DTU timing task list and execution result are added to the platform and transmitted through this message

This message needs to be sent to the platform whether or not the scheduled task list is added successfully. When the execution fails, the STATUS bit position in the DTU_CMD command is 1, and the data length is 0. When the execution is successful, the STATUS flag position in the DTU_CMD command is 0.

- Format of downlink instruction message:

DTU_CMD	MSER	MDATA_LEN	MDATA	
			TASK_ID	DATA
0x03	2Byte	2Byte	1Byte	nByte

- Uplink data message format when execution successful:

DTU_CMD	MSER	MDATA_LEN	MDATA
			TASK_ID
0x83	2Byte	2Byte	1Byte

- Uplink data message format when execution failed:

DTU_CMD	MSER	MDATA_LEN	MDATA	
			TASK_ID	ERROR_CODE
0xC3	2Byte	2Byte	1Byte	1Byte

> 📝 **NOTE**
>
> - **TASK_ID**: Task list id
> - **DATA**: Task list content
> - **ERROR_CODE**: Error code

4. **Remove Polling Task List**

The platform removes the DTU timing task list and the execution results are transmitted through this message.

The message needs to be sent to the platform whether or not the scheduled task list is successfully removed. When the execution fails, the STATUS bit position in the DTU_CMD command is 1, and the data length is 0. When the execution is successful, the STATUS flag position in the DTU_CMD command is 0.

> 📝 **NOTE**
>
> If the specified task list ID is not found in the DTU, it will be regarded as successful execution.

- Format of downlink instruction message:

DTU_CMD	MSER	MDATA_LEN	MDATA
			TASK_ID
0x04	2Byte	2Byte	1Byte

- Message format when execution successful:

DTU_CMD	MSER	MDATA_LEN	MDATA
0x84	2Byte	2Byte	TASK_ID
			1Byte

- Message format when execution failed:

DTU_CMD	MSER	MDATA_LEN	MDATA	
0xC4	2Byte	2Byte	TASK_ID	ERROR_CODE
			1Byte	1Byte

> 📝 **NOTE**
>
> - **TASK_ID**: Task list id
> - **ERROR_CODE**: Error code

5. **Read the Polling Task List**

The platform reads the DTU timing task list and transmits the execution result through this message.

The message needs to be sent to the platform whether or not the scheduled task list is read successfully. When the execution fails, the STATUS bit position in the DTU_CMD command is 1, and the data length is 0. When the execution is successful, the STATUS flag position in the DTU_CMD command is 0.

- Format of downlink instruction message:

DTU_CMD	MSER	MDATA_LEN	MDATA
0x05	2Byte	2Byte	TASK_ID
			1Byte

- Uplink data message format when execution successful:

DTU_CMD	MSER	MDATA_LEN	MDATA	
0x85	2Byte	2Byte	TASK_ID	DATA
			1Byte	nByte

- Uplink data message format when execution failed:

DTU_CMD	MSER	MDATA_LEN	MDATA	
0xC5	2Byte	2Byte	TASK_ID	ERROR_CODE
			1Byte	1Byte

> 📝 **NOTE**
>
> - **TASK_ID**: Task list id
> - **DATA**: Task list content
> - **ERROR_CODE**: Error code

6. **Add Scheduled Task Message**

The platform adds DTU scheduled task message and transmits the result through this message.

This message needs to be sent to the platform no matter whether the scheduled task is added successfully or not. When the execution fails, the STATUS bit position in the DTU_CMD command is 1, and the data length is 0. When the execution is successful, the STATUS flag position in the DTU_CMD command is 0.

- The format of the downlink instruction message:

DTU_CMD	MSER	MDATA_LEN	MDATA				
0x0A	2Byte	2Byte	TASK_ID	SCH_TYPE	W	H	M
			1Byte	nByte	1Byte	1Byte	1Byte

- Uplink data message when execution successful:

DTU_CMD	MSER	MDATA_LEN	MDATA
0x8A	2Byte	2Byte	TASK_ID
			1Byte

- Uplink data message when execution failed:

DTU_CMD	MSER	MDATA_LEN	MDATA	
0xCA	2Byte	2Byte	TASK_ID	ERROR_CODE
			1Byte	1Byte

> 📝 **NOTE**
>
> - **TASK_ID**： Task ID
> - **SCH_TYPE**: Type of scheduled task
> - 0x00 execute once per hour
> - 0x01 execute once per day
> - 0x02 execute once per week
> - **W**: Which day of this week; 0 For Sunday, 1 ~ 6 For Monday ~ Saturday
> - **H**: Hour
> - **M**: Minute
> - **S**: Second
> - **DATA**： The data of the task
> - **ERROR_CODE**: error code

7. **Remove Scheduled Task Message**

The platform removes DTU scheduled task message and transmits the result through this message.

This message needs to be sent to the platform no matter whether the scheduled task is removed successfully or not. When the execution fails, the STATUS bit position in the DTU_CMD command is 1, and the data length is 0. When the execution is successful, the STATUS flag position in the DTU_CMD command is 0.

> 📝 **NOTE**
>
> When the specified task list ID is not found in DTU, it is considered that the execution is successful.

- The format of the downlink instruction message:

DTU_CMD	MSER	MDATA_LEN	MDATA
0x0B	2Byte	2Byte	TASK_ID 1Byte

- Uplink data message when execution successful:

DTU_CMD	MSER	MDATA_LEN	MDATA
0x8B	2Byte	2Byte	TASK_ID 1Byte

- Uplink data message when execution failed:

DTU_CMD	MSER	MDATA_LEN	MDATA	
0xCB	2Byte	2Byte	TASK_ID 1Byte	ERROR_CODE 1Byte

> 📝 **NOTE**
>
> - **TASK_ID**：Task ID
> - **ERROR_CODE**: error code

8. **Read Scheduled Task Message**

The platform reads DTU scheduled task message and transmits the result through this message.

This message needs to be sent to the platform no matter whether the scheduled task is read successfully or not. When the execution fails, the STATUS bit position in the DTU_CMD command is 1, and the data length is 0. When the execution is successful, the STATUS flag position in the DTU_CMD command is 0.

- The format of the downlink instruction message:

DTU_CMD	MSER	MDATA_LEN	MDATA
0x0C	2Byte	2Byte	TASK_ID
			1Byte

- Uplink data message when execution successful:

DTU_CMD	MSER	MDATA_LEN	MDATA				
0x8C	2Byte	2Byte	TASK_ID	SCH_TYPE	W	H	M
			1Byte	1Byte	1Byte	1Byte	1Byte

- Uplink data message when execution failed:

DTU_CMD	MSER	MDATA_LEN	MDATA	
0xCC	2Byte	2Byte	TASK_ID	ERROR_CODE
			1Byte	1Byte

> 📝 **NOTE**
>
> - **TASK_ID**： task ID
> - **SCH_TYPE**: type of scheduled task
> - 0x00 execute once per hour
> - 0x01 execute once per day
> - 0x02 execute once per week
> - **W**: which day of this week; 0 For Sunday, 1 ~ 6 For Monday ~ Saturday
> - **H**: Hour
> - **M**: Minute
> - **S**: Second
> - **DATA**： The data of the task

9. **Read LoRa Configuration**

The platform reads the LoRa configuration and transmits the result through this message. Platform read message fdata is empty.

This message needs to be sent to the platform whether the LoRa configuration is read successfully or not. When the execution fails, the STATUS bit position in the DTU_CMD command is 1, and the data length is 0. When the execution is successful, the STATUS flag position in the DTU_CMD command is 0.

- Format of downlink instruction message:

DTU_CMD	MSER	MDATA_LEN	MDATA
0x06	2Byte	2Byte	0Byte

- Uplink data message format when execution successful:

DTU_CMD	MSER	MDATA_LEN	MDATA				
			DATARATE	TXPWR	CONFIRM	RETRY	ADR
0x86	2Byte	2Byte	1Byte	1Byte	1Byte	1Byte	1Byte

- Uplink data message format when execution failed:

DTU_CMD	MSER	MDATA_LEN	MDATA
			ERROR_CODE
0xC6	2Byte	2Byte	1Byte

> 📝 **NOTE**
>
> - **DATARATE**: Rate (0 – 5)
> - **TXPOWER**: Transmit power (0 - 20)
> - **CONFIRM**: Whether to turn on ack. 0 - off, 1 - on
> - **RETRY**: Maximum retransmission times when ACK is on (0 ~ 15)
> - **ADR**: Whether to turn on dynamic rate adjustment (ADR) 0 - off, 1 - on
> - **DUTYCYCLE**: Is the duty cycle limit on 0 - off, 1 – on

10. **Set LoRa Configuration**

The platform reads the configuration and transmits the result through this message. Platform read message fdata is empty.

This message needs to be sent to the platform whether the LoRa configuration is read successfully or not. When the execution fails, the STATUS bit position in the DTU_CMD command is 1, and the data length is 0. When the execution is successful, the STATUS flag position in the DTU_CMD command is 0.

- Format of downlink instruction message:

DTU_CMD	MSER	MDATA_LEN	MDATA				
			DATARATE	TXPWR	CONFIRM	RETRY	ADR
0x07	2Byte	2Byte	1Byte	1Byte	1Byte	1Byte	1Byte

- Uplink data message format when execution successful:

DTU_CMD	MSER	MDATA_LEN	MDATA
0x87	2Byte	2Byte	0Byte

- Uplink data message format when execution failed:

DTU_CMD	MSER	MDATA_LEN	MDATA
0xC7	2Byte	2Byte	ERROR_CODE 1Byte

> 📝 **NOTE**
>
> - **DATARATE**: Rate (0 – 5)
> - **TXPOWER**: Transmit power (0 - 20)
> - **CONFIRM**: Whether to turn on ACK, 0 - off, 1 - on
> - **RETRY**: Maximum retransmission times when ACK is on (0 ~ 15)
> - **ADR_ENABLE**: Whether to turn on dynamic rate adjustment (ADR) 0 - off, 1 - on
> - **DUTYCYCLE_ENABLE**: Is the duty cycle limit on 0-off, 1-on

11. **Read DTU Configuration**

The DTU configuration and results read by the platform are transmitted through this message. Platform read message fdata is empty.

This message needs to be sent to the platform whether the DTU configuration is read successfully or not. When the execution fails, the STATUS bit position in the DTU_CMD command is 1, and the data length is 0. When the execution is successful, the STATUS flag position in the DTU_CMD command is 0.

- Format of downlink instruction message:

DTU_CMD	MSER	MDATA_LEN	MDATA
0x08	2Byte	2Byte	0Byte

- Uplink data message format when execution successful:

DTU_CMD	MSER	MDATA_LEN	MDATA				
0x88	2Byte	2Byte	POLL ENABLE	POLL PERIOD	BUS TIMEOUT	RETRY	RS485
			1Byte	1Byte	1Byte	1Byte	1Byte

- Uplink data message format when execution failed:

DTU_CMD	MSER	MDATA_LEN	MDATA
0xC8	2Byte	2Byte	ERROR_CODE 1Byte

> 📝 **NOTE**
>
> - **POLL ENABLE**: Enables scheduled polling, 0 - off, 1 - on
> - **POLL PERIOD**: Polling period, in seconds
> - **BUS TIMEOUT**: Bus timeout. The unit is seconds.
> - **RETRY**: Number of retries after bus timeout. 0 - turn off retry function
> - **RS485**: 485 bus parameters

Definition	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
	Baud rate			Data Bit	Stop Bit		Check Code	
Details	0: 2400 1: 4800 2: 9600 3: 14400 4: 19200 5: 38400 6: 57600 7: 115200			0: 8bit 1: 9bit	0: 1bit 1: 1.5bit 2: 2bit		0: NONE 1: EVEN 2: ODD	

12. **Set DTU Configuration**

DTU configuration and results of platform settings are transmitted through this message. Set the result message fdata to null.

This message needs to be sent to the platform whether the DTU configuration is read successfully or not. When the execution fails, the STATUS bit position in the DTU_CMD command is 1, and the data length is 0. When the execution is successful, the STATUS flag position in the DTU_CMD command is 0.

- Format of downlink instruction message:

DTU_CMD	MSER	MDATA_LEN	MDATA				
0x09	2Byte	2Byte	POLL ENABLE	POLL PERIOD	BUS TIMEOUT	RETRY	RS485
			1Byte	1Byte	1Byte	1Byte	1Byte

- Uplink data message format when execution successful:

DTU_CMD	MSER	MDATA_LEN	MDATA
0x89	2Byte	2Byte	0Byte

- Uplink data message format when execution failed:

DTU_CMD	MSER	MDATA_LEN	MDATA
0xC9	2Byte	2Byte	ERROR_CODE
			1Byte

> 📝 **NOTE**
>
> - **POLL ENABLE**: Enables scheduled polling, 0 - off, 1 - on
> - **POLL PERIOD**: Polling period, in seconds
> - **BUS TIMEOUT**: Bus timeout. The unit is seconds.
> - **RETRY**: Number of retries after bus timeout. 0 - turn off retry function
> - **RS485**: 485 bus parameters

Definition	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
	Baud rate			Data Bit	Stop Bit		Check Code	
Details	0: 2400 1: 4800 2: 9600 3: 14400 4: 19200 5: 38400 6: 57600 7: 115200			0: 7bit 1: 8bit	0: 1bit 1: 1.5bit 2: 2bit		0: NONE 1: EVEN 2: ODD	

13. **Initialize LoRa Configuration**

LoRa configuration and results of platform initial call are transmitted through this message. The message fdata is empty.

It needs to be sent to the platform whether the DTU configuration is read successfully or not. When the execution fails, the STATUS bit position in the DTU_CMD command is 1, and the data length is 0. When the execution is successful, the STATUS flag position in the DTU_CMD command is 0.

- Format of downlink instruction message:

DTU_CMD	MSER	MDATA_LEN	MDATA
0x1D	2Byte	2Byte	0Byte

- Uplink data message format when execution successful:

DTU_CMD	MSER	MDATA_LEN	MDATA
0x9D	2Byte	2Byte	0Byte

- Uplink data message format when execution failed:

DTU_CMD	MSER	MDATA_LEN	MDATA
0xDD	2Byte	2Byte	ERROR_CODE 1Byte

- The initial value of LoRa configuration:

DATARATE	0 – DR_0
TXPOWER	19 – 19dBm
CONFIRM	1 – open
RETRY	3 – retransmission 3 times
ADR_ENABLE	1 – open
DUTYCYCLE_ENABLE	0 – close

14. **Initialize DTU Configuration**

LoRa configuration and results of platform initial call are transmitted through this message. The message data is empty.

It needs to be sent to the platform whether the DTU configuration is read successfully or not. When the execution fails, the STATUS bit position in the DTU_CMD command is 1, and the data length is 0. When the execution is successful, the STATUS flag position in the DTU_CMD command is 0.

- Format of downlink instruction message:

DTU_CMD	MSER	MDATA_LEN	MDATA
0x1E	2Byte	2Byte	0Byte

- Uplink data message format when execution successful:

DTU_CMD	MSER	MDATA_LEN	MDATA
0x9E	2Byte	2Byte	0Byte

- Uplink data message format when execution failed:

DTU_CMD	MSER	MDATA_LEN	MDATA
0xDE	2Byte	2Byte	ERROR_CODE 1Byte

- The initial value of DTU:

POLL_ENABLE		1（opened）
POLL_PERIOD		3600 （seconds）
BUS TIMEOUT		1000 （milliseconds）
RS485	0xE0	Baud rate: 115200 Data bits: 8 Stop bit: 1 Check code: NONE

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