



# LoRaWAN Cattle Tracker

## Payload protocol\_V2.0

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Kotonlink Co.,LTD

(All versions, reprints must be corrected)

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Version	Time	Describe	The modifier
V1.0	2021-07-26	New document	Ming
V2.0	2021-08-16	Update agreement content	Ming

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# Table of Contents

directory

<b>1 scope</b> .....	<b>- 3 -</b>
<b>2 Terminal data structure</b> .....	<b>- 3 -</b>
<b>3 Payload Data protocol</b> .....	<b>- 4 -</b>

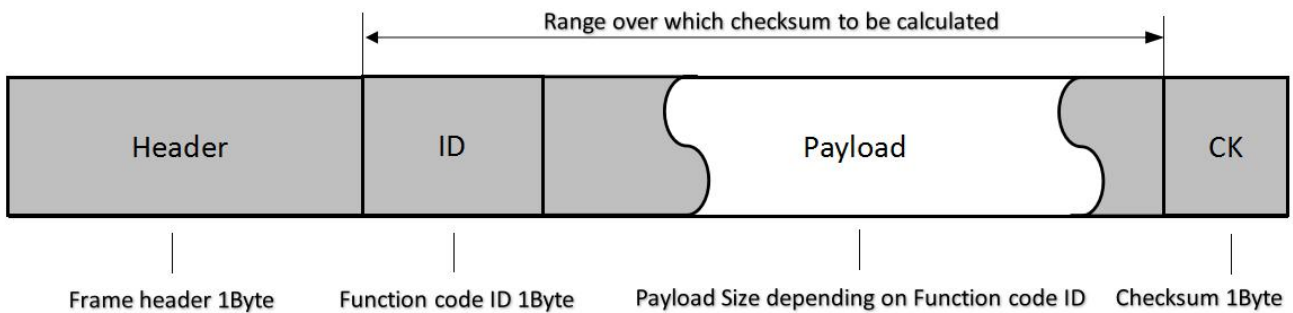
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# 1 The scope of

This standard defines the definition specification of upstream and downstream message protocols for LoRa cattle locators.

This standard is applicable to the configuration, operation, data receiving and receiving of cattle equipment.

## 2 Terminal data structure



Description:

Header: indicates the data frame header. The behavior on data is 0xAA, the behavior on normal data link is 0xBB, and the behavior on time calibration data link is 0xFF.

ID: Function code ID, indicating the protocol Function ID.

Payload: indicates the content of a specific packet.

CK: Checksum include payload. The algorithm is as follows, and Buffer[N] indicate the data to be accumulated.

```
Ck_sum = 0
For(i=0; i<N; i++)
{
    ck_sum = ck_sum + Buffer[i]
    ck_sum = ck_sum % 0x100
}
Ck_sum = 0xFF - Ck_sum
Return ck_sum
```

Note: the direction of sending data from terminal to gateway/server, the order of sending characters,

high first, position last

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### 3 Payload data protocol

#### 3.1 Uploading satellite positioning data (Function Code ID = 0x01)

Payload contents

Byte offset	Format	Name	Content	Unit	Description
1	U8	ID	0x01		Protocol Function ID
1	U8	Length			Payload Data length
8	U32	Timestamp			UTC time
8	U32	lat			Latitude
8	U32	lon			Longitude
1	U8	Speed		Km/h	Speed
2	U16	Angle		deg.	The azimuth Angle
2	U16	Altitude		m	At an altitude of
2	U16	NA	Not available yet		Reserved for Step count
1	U8	Electricity			Percentage of electricity
1	U8	Alarm state			The alert state
1	U8	CK			Check

Example: aa011561177cf901589fc406ca2d4e00000200000000640070

aa: Indicates the Header frame header. The value is 0xAA on the uplink

01: Specifies the ID of a function protocol

15: indicates the data length

61177cf9: UTC time 1628929273 = 2021-08-14 16:21:13

01589fc4: Latitude, 22585284 = 22585284/1000000 = 22.585284 (dd.dddd format);

06ca2d4e: Indicates longitude, 113913166 = 113913166/1000000 = 113.913166 (dd.dddd format);

00: Indicates speed, range: 0-- 255km/h (moving speed of satellite detection equipment)

0002: Azimuth, 2 degrees, range: 0 to 359

0000: Indicates altitude (altitude of satellite detection equipment)

0000: Indicates the number of steps (function reserved, not available yet)

64: represents electric quantity, 0x64 = 100%



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is -85.

After **00** - said several Bluetooth positioning label data, each label is 6 bytes, fill 0 means when no labels. Each piece of data contains a maximum of five label information.

**64:** Represents electric quantity,  $0x64 = 100\%$

**00:** Indicates alarm status,  $0x00$  indicates no alarm, (Bit0:SOS alarm Bit1: low voltage alarm Bit2: remove alarm)

**4c:** Check

### 3.3 Uploading heartbeat data (Function code ID = 0x03)

Payload contents

Byte offset	Format	Name	Content	Unit	Description
1	U8	ID	0x03		Protocol Function ID
1	U8	Length			Payload Data length
8	U32	Timestamp			UTC time
2	U16	Step count			Step count
1	U8	Electricity			Percentage of electricity
1	U8	Alarm state			The alert state
1	U8	CK			Check

**Example:** aa030861171f760000380050

**aa:** Indicates the Header frame header. The value is  $0xAA$  on the uplink

**03:** Specifies the ID of a function protocol

**08:** Indicates the data length

**61171f76:** UTC time 1628905334 = 2021-08-14 09:42:14

**0000:** Indicates the number of movement steps (function reserved, not available yet)

**38:** represents electric quantity,  $0x38 = 40\%$

**00:** Indicates alarm status,  $0x00$  indicates no alarm, (Bit0:SOS alarm Bit1: low voltage alarm Bit2:



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remove alarm)

50: Check

Note: The heartbeat data will be reported when the device cannot be located by satellite or Bluetooth, and it is time to report the positioning data

### 3.4 Uplink cycle setting (Function code ID = 0xB0)

Payload contents

Byte offset	Format	Name	Content	Unit	Description
1	U8	ID	0xB0		Protocol Function ID
1	U8	Length	0x02		Payload Data length
2	U16	Time period		S	From 60 to 65535S
1	U8	CK			Check

Example: BBB002012CDF

BB: Indicates the Header frame header. The downlink is 0xBB.

B0: Indicates the ID of the function protocol.

02: Indicates the data length.

012C: Indicates the data content. 0x12C = 300, in seconds

DF: Indicates the parity value

Uplink interval set the response frame reply Payload

Byte offset	Format	Name	Content	Unit	Description
8	U32	Timestamp			UTC time
8	U32	lat			Latitude
8	U32	lon			Longitude
1	U8	Speed		Km/h	Speed
2	U16	Angle		deg.	The azimuth Angle

2	U16	Altitude		m	At an altitude of
1	U8	ID	0xB0		Protocol function ID
1	U8	Length	0x03		Payload Data length
2	U16	Time period		S	From 60 to 65535S
1	U8	State			0x01= success, 0x00= failure
1	U8	CK			Check

Example: aa6119c0e001589fc606ca2d34000000000b003012c0163

**Aa:** Indicates the Header frame header. The value is 0xAA on the uplink

**6119C0e0:** UTC time. 6119c0e0 =1629077728=2021-08-16 09:35:28

**01589fc6:** Indicates latitude, 22585286 =22585286/1000000 =22.585286 (dd.dddd format);

**06ca2d34:** indicates longitude, 113913140 = 113913140/1000000 = 113.913140 (dd.dddd format);

**00:** Indicates the speed, the speed is 0;

**0000:** Indicates azimuth;

**0000:** Altitude;

**B0:** Indicates the device uplink period setting response frame;

**03:** Indicates the length of response frame data;

**012C:** Indicates the time to be adjusted, 0x012c=300 seconds;

**01:** Indicates whether the command is executed successfully. 0x01= successful, 0x00= failed.

**63:** Check

### 3.5 Remove alarm settings (Function code ID = 0xB2)

Payload contents

Byte offset	Format	Name	Content	Unit	Description
1	U8	ID	0xB2		Protocol Function ID
1	U8	Length	0x01		Payload Data length
2	U8	State			0x00= Disabled;0 x01 = enabled
1	U8	CK			Check

Example: BBB20100B3

**BB:** Indicates the Header frame header. The downlink is 0xBB.

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**B2:** Indicates the ID of the functional protocol.

**02:** Indicates the data length.

**00:** Indicates the alarm status. 0x00 = disabled, 0x01= enabled

**B3:** Check

**Set the response frame Payload to respond to the device dismantling alarm**

Byte offset	Format	Name	Content	Unit	Description
8	U32	Timestamp			UTC time
8	U32	lat			Latitude
8	U32	lon			Longitude
1	U8	Speed		Km/h	Speed
2	U16	Angle		deg.	The azimuth Angle
2	U16	Altitude		m	At an altitude of
1	U8	ID	0xB2		Protocol Function ID
1	U8	Length	0x02		Payload Data length
2	U8	State			0x00 = enabled;0 x01 = is not enabled
1	U8	State			0x01= Execution Succeeded, 0x00= Execution failed
1	U8	CK			Check

**Example:** aa611b4c2600000000000000000000000000000000b2020001a3

**Aa:** Indicates the Header frame header. The value is 0xAA on the uplink

**611b4c26:** UTC time, 6119C0e0 =1629077728=2021-08-16 09:35:28

**00000000:** Latitude, 22585286 =22585286/1000000 =22.585286 (dd.dddd format);

**00000000:** Indicates longitude, 113913140 = 113913140/1000000 = 113.913140 (dd.dddd format);

**00:** Indicates the speed, the speed is 0;

**0000:** Indicates azimuth;

**0000:** Altitude;

**B2:** Represents the response frame of equipment dismantling alarm setting;

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**02:** Indicates the length of response frame data;

**00:** Indicates that the alarm setting state is removed, 0x00= disabled, 0x01= enabled;

**01:** Indicates whether the command is executed successfully. 0x01= successful, 0x00= failed.

**A3:** Check

### 3.6 Device parameter query (Function code ID = 0xB3)

Payload contents

Byte offset	Format	Name	Content	Unit	Description
1	U8	ID	0xB3		Protocol Function ID
1	U8	Length	0x00		Payload Data length
2	U8	State	empty		Don't fill in
1	U8	CK			Check

Example: BBB300B3

**BB:** Indicates the Header frame header. The downlink is 0xBB.

**B3:** Function protocol ID code;

**00:** Indicates the data length;

**B3:** Check

#### Device parameter query response frame Payload

Byte offset	Format	Name	Content	Unit	Description
8	U32	Timestamp			UTC time
8	U32	lat			Latitude
8	U32	lon			longitude
1	U8	Speed		Km/h	Speed
2	U16	Angle		deg.	The azimuth Angle
2	U16	Altitude		m	At an altitude of
1	U8	ID	0xB3		Protocol function ID
1	U8	Length	0x05		Payload data length





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**B5:** Indicates the ID of the function protocol, which can be restored to factory Settings.

**01:** Indicates the data length.

**01:** Indicates the execution status. 0x00= Execution failed, 0x01= execution failed

**06:** Check

### 3.8 Set off (Function code ID = 0xBA)

Payload contents

Byte offset	Format	Name	Content	Unit	Description
1	U8	ID	0xBA		Protocol Function ID
1	U8	Length	0x01		Payload Data length
1	U8	Time period		min	Minutes
1	U8	CK			Check

**Example:** BBBA010692

**BB:** indicates the Header frame header. The downlink is 0xBB.

**B3:** represents the functional protocol ID code, and the shedding detection setting;

**00:** Indicates the data length;

**B3:** Check

**When the device is restored to factory Settings, frame Payload is returned**

Byte offset	Format	Name	Content	Unit	Description
8	U32	Timestamp			UTC time
8	U32	lat			Latitude
8	U32	lon			Longitude
1	U8	Speed		Km/h	Speed
2	U16	Angle		deg.	The azimuth Angle
2	U16	Altitude		m	At an altitude of
1	U8	ID	0xBA		Protocol Function ID
1	U8	Length	0x0		Payload Data length

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1	U8	Time period		min	Minutes
1	U8	State			0x01= Execution succeeded, 0x00= execution failed
1	U8	CK			Check

Example: aa611b868300000000000000000000000000000000ba02060148

Aa: Indicates the Header frame header. The value is 0xAA on the uplink

611B8683: UTC time, 611B8683 =1629193859=2021-08-17 17:50:59

00000000: Latitude, dd.dddd format;

00000000: Indicates longitude, dd. dddd format;

00: Indicates the speed, the speed is 0;

0000: Indicates azimuth;

0000: Altitude;

BA: Indicates the functional protocol ID code, remove the alarm time setting;

02: Indicates the data length.

06: Indicates adjustment time, 0x06=6 minutes;

01: Indicates the execution status. 0x00= Execution failed, 0x01= execution failed

06: Check

### 3.9 Time calibration request

Payload contents

Byte offset	Format	Name	Content	Unit	Description
1	U8	Header	0xFF		The frame header
1	U8	ID	0x00		Protocol Function ID
1	U8	End	0xFF		The frame tail

Example: FF00FF

### 3.10 Format of time calibration instruction

Payload contents



Byte offset	Format	Name	Content	Unit	Description
1	U8	Header	0xFF		The frame header
1	U8	ID	0x10		Protocol Function ID
1	U16	Years		Years	
1	U8	month		Month	
1	U8	Day		day	
1	U8	time		Time	
1	U8	Minute		Minute	
1	U8	Seconds		Seconds	
1	U8	End	0xFF		

**Example: FF1007E50811121B37FF**

**FF:** Indicates the Header frame header. The downlink time calibration link is 0xFF

**10:** Indicates the function protocol ID and time calibration setting

**07E5:** Year, the value is 2021

**08:** Month, the value is 08

**11:** Day, the value is 17

**12:** Time, the value is 18

**1B:** Minute, the value is: 27

**37:** Seconds, the value is 55

**FF:** End

**Note:** Time calibration is delivered by the platform, and the platform actively delivers it. After receiving it, the terminal adjusts the opening time. This parameter is recommended when the terminal is located by Bluetooth or is not located. If the satellite is successfully repositioned, the terminal UTC time uses the satellite time.