



LW004-CT

User Manual

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1 About this Manual

The purpose of this manual is to outline how to apply LW004-CT in suitable scenarios, as well as the main function of LW004-CT.

2 Product Introduction

2.1 Overview

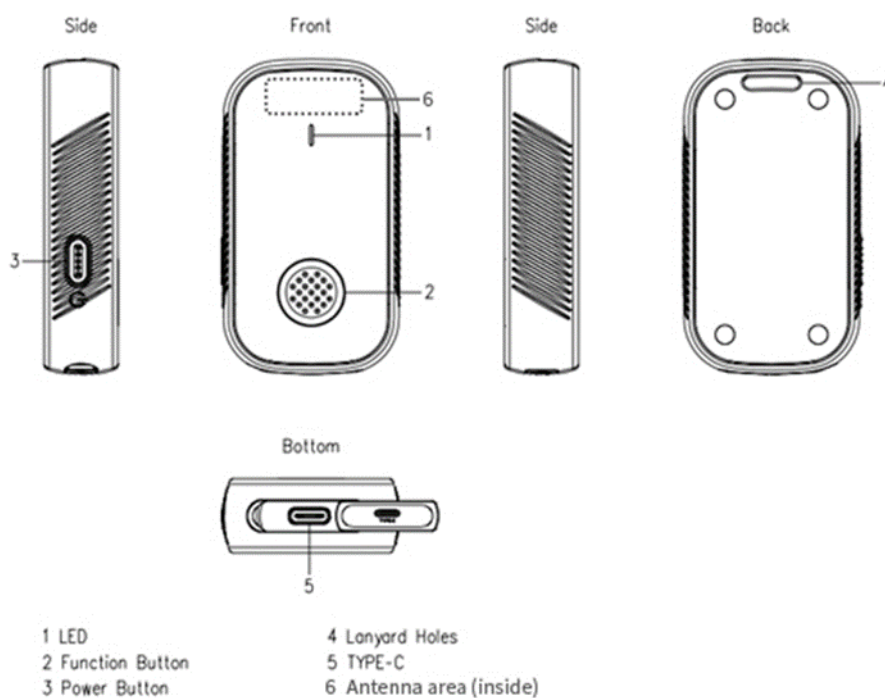
The LW004-CT is a long-range contact tracker for Class A type devices based on the LoRaWAN open protocol and is compatible with the LoRaWAN protocol. It is small, compact, and easy to use. It can be used to track close contact and social safety distance reminder.

2.2 Application

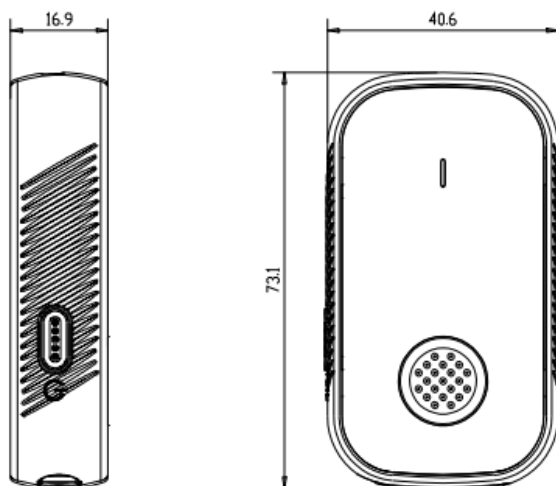
- Positioning & Location Tracking
- Contact Tracing
- Safe Distance Reminder

2.3 Product Specifications

2.3.1 Appearance



2.3.2 Mechanical Size



2.3.3 LED Indicators and Button

Items	Indicator	Operation	Remarks
Turn ON	Green LED Blink 3S	Press and hold the power button for 3 seconds till the green indicator flashes quickly and release. The indicator will flash green for 3 seconds to show the LW004-CT is turned on.	
Turn OFF	Solid red and keep 3S	Press and hold the power button for 3 seconds till the LED indicate red and release. The LED will indicate red for 3 seconds to show the LW004-CT is turned off.	
Hardware reset	Solid green and keep 3S, then device restart and green LED Blink 3S	When the device is off, press and hold the power button for 10 seconds till the LED indicate solid green 3s and release button.	If user press and hold the power button over 12 seconds, the device will turn off after hardware reset. After it reset successfully the device parameters will be reset to factory values except the MAC address.
Bluetooth	Green LED Blink 1S	Connect to the device via	When the device in alarm

connection established successfully		APP successfully	status the indicator may be not visible.
Bluetooth connection disconnected	Red LED Blink 1S	APP disconnect to the device	When the device in alarm status the indicator may be not visible.
Join LoRa Network	Solid white and keep 3S	If the device had never Joined any network, after turning on, the device will automatically send join request	It will send join request automatic after power on the device or save "LoRa Setting" parameter in APP. When the device in alarm status the indicator may be not visible.
Trigger Distance Alarm	Red LED Blink 3S and motor vibrate for one cycle. If the alarm continues, the motor will continue to vibrate for another one cycle and the red light will blink for another 3 seconds.	No matter whether the LoRa network connection is successful, the alarm will be alerted when the safety distance reminder condition is reached.	Motor alarm and indicator light alarm can be configured with switch status. The default mode of motor alarm and indicator light alarm is on.
Turn off the indicator light and motor vibration for alarm	Blue LED Blink 3S	Press function button and hold on 5S	
Firmware Upgrade	Green LED Blink during the upgrade/Solid Green and keep 2S after upgrade successfully /Solid Red and keep 2S after upgrade failed	Firmware upgrade via OTA in DFU mode	
Charging	Blue LED blink during Charging	Plug in type-c charger	
Full Charged	Solid Green	Plug in type-c charger	The lights go out after unplug the charger
Low Battery Reminder	Yellow LED Blink once every 10s	Battery level lower than the set value	
Status indicators	Solid Green and keep one second means that the device is on, otherwise the device is off.	Double click the power button	
Trigger SOS Alarm	Solid Red and keep one second, then Solid Green and keep one	Double click the function button in 1s	

	second, then Solid Blue and keep one second.		
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3 Device Feature and Function

3.1 Introduction to Device Application

3.1.1 Contact Tracing

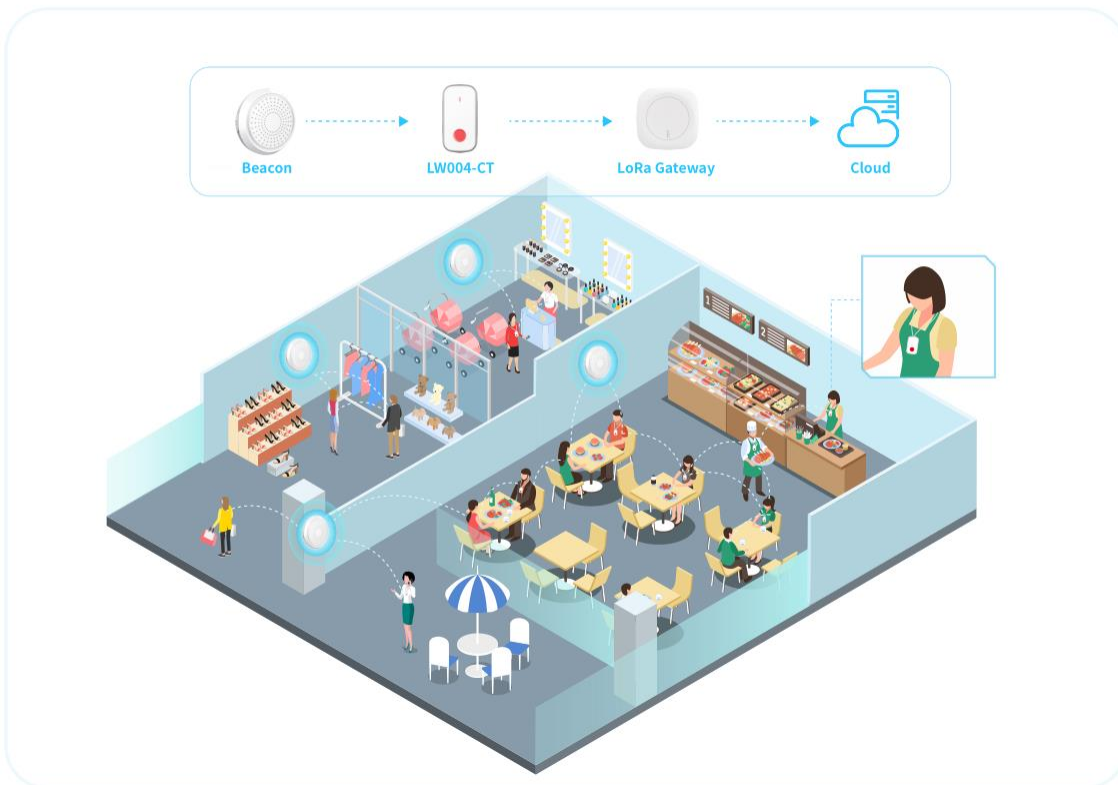
LW004-CT is commonly used for contact tracing in schools, hospitals, companies, factories and other densely populated areas. The close contact information can be used for surveillance and early warning When a major public health event occurs.

When the device is powered on and normally connected to the network, the device will report *Contact Tracing Payload* at fixed intervals (Interval time can be set).

Note: Users can choose whether to include location information in the Contact Tracing Payload. If location information is included, users need to install the location beacon in advance.

Example of corporate office scenario:

- All employees should wear the LW004-CT, and install the fixed location beacon (Take Moko beacon product H2 as an example) on the corresponding location in the office area to ensure that the Bluetooth broadcast range of these Bluetooth Beacons can cover the whole office.
- By setting the broadcast information of LW004-CT & H2 and the filter condition of LW004-CT, you can successfully ignore the unneeded Bluetooth device data, and you can set the determination distance of close contact. (Refer to [Chapter 7](#) for an example of how to set the filter condition)
- In case of close Contact between employees wearing LW004-CT, each employee's LW004-CT will record this close contact. *Contact Tracing Payload* will be reported in turn after reaching the reporting time point.
- Since each LW004-CT has a unique MAC address and the installation location of H2 is known in advance, by analyzing the *Contact Tracing Payload*, the user can obtain the information about the person in close contact, when the close contact occurred and the approximate location where the close contact occurred.



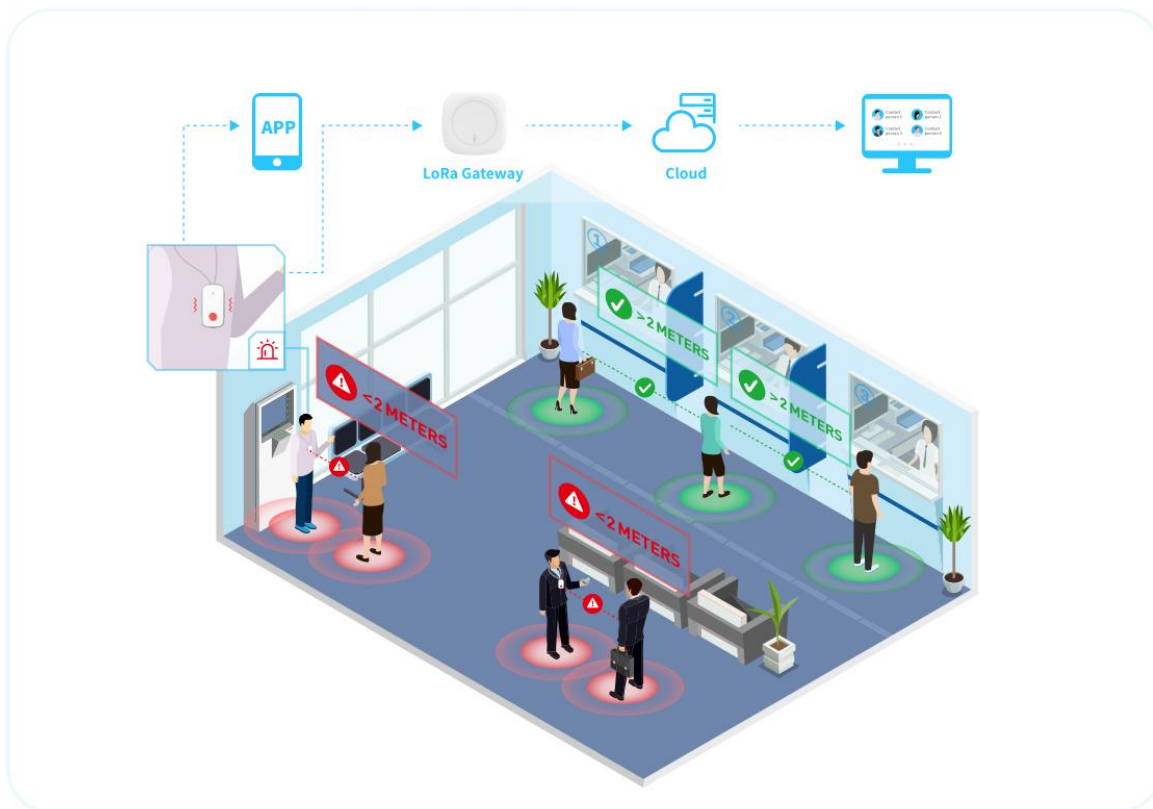
3.1.2 Social Distance Alarm

Distance alarm function is mainly used for distance keeping in public places. Users can set different distance requirements according to different scenes, which can be achieved by setting Alarm Trigger RSSI.

Example of hospital:

- All employees should wear the LW004-CT.
- By setting the broadcast information of LW004-CT and the *Filter Condition* of LW004-CT, Unneeded Bluetooth device data can be successfully ignored. (Refer to *Chapter 7* for an example of how to set a filter condition)
- Users can adjust the determination distance of social distance alarm by setting Gather Warning RSSI.
- The system will judge all close contacts, if the distance of the close contact is less than the set value, the device will trigger a distance alarm, at which time the device will vibrate, the indicator light will flash red, and the *Distance Alarm Payload* will be reported immediately. *Distance Alarm Payload* mainly contains close contact data for close contacts that trigger distance alarms.
- When the distance alarm is triggered, the corresponding employee should pay attention to his or her position with others in time and keep a certain distance.

Note: Users can choose whether to include location information in the Close Contact Data. If location information is included, users need to install the location beacon in advance.



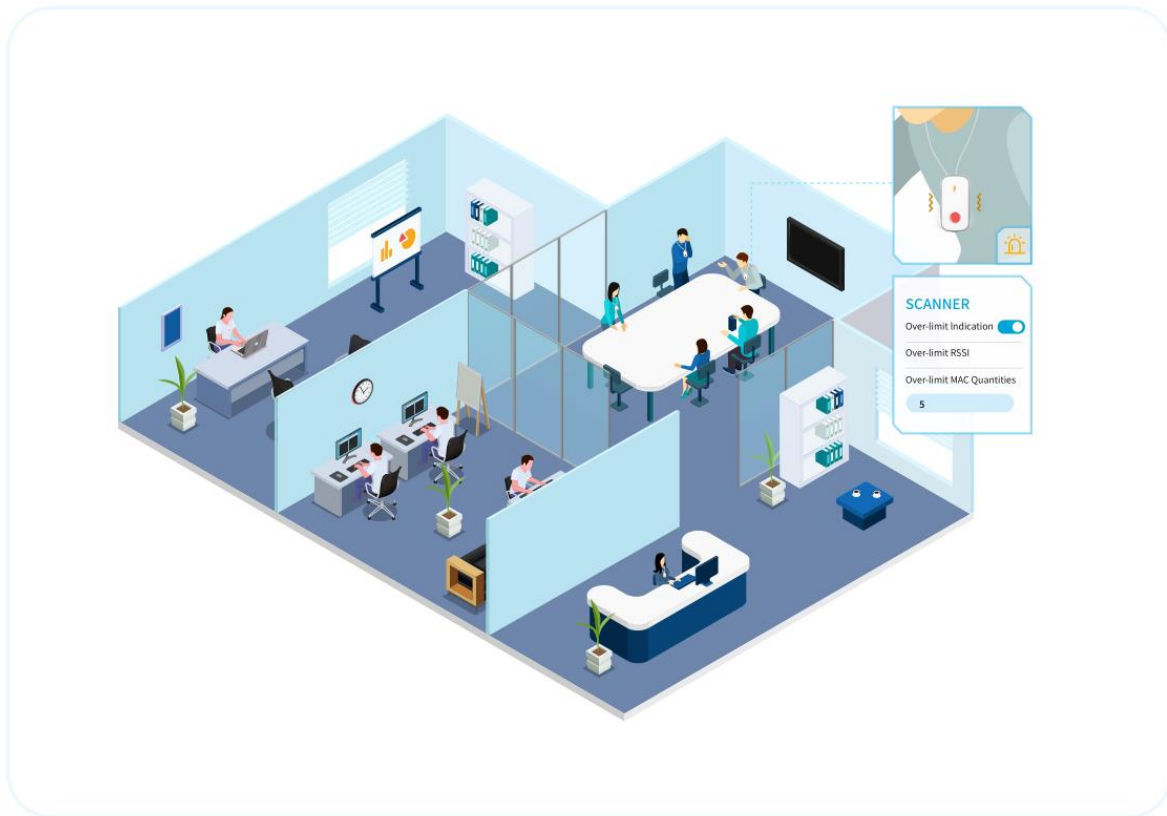
3.1.3 Gather Warning

Gather Warning is mainly used in public social occasions, such as hospitals, schools, nursing homes, factories and other scenarios.

When a certain number of people gather near a certain person, the LW004-CT worn by this person will sound an alarm, the device will vibrate and the indicator light will flash yellow.

Users can adjust the Gather Warning RSSI according to different scenarios, that is, to adjust the coverage space of the Gather Warning. The coverage space is a circle with a certain person as the center, and the radius of the circle is determined by Gather Warning RSSI.

Note: According to the usage logic, the priority of Social Distance Alarm is higher than Gather Warning, so the coverage of Gather Warning will be larger than Social Distance alarm. When a Social Distance Alarm and a Gather Warning occur simultaneously, only Social Distance Alarm will take effect.



3.1.4 SOS Alarm

SOS alarm is mainly used for emergency situations, suitable for nursing homes, schools, hospitals, etc.

- When the user wearing LW004-CT encounters an emergency, the SOS alarm can be triggered once by double-clicking the red button on the front of the device within 1S, the corresponding indicator light will flash.
- Each time the SOS alarm is triggered, the device will upload two *SOS Alarm Payload*. The first one will be uploaded immediately after the SOS alarm is triggered, and the other one will be reported N minutes later. If the user triggers the SOS alarm again before the second *SOS Alarm Payload* is sent out, another *SOS Alarm Payload* will be uploaded N minutes after the second *SOS Alarm Payload* is sent out.
- Since close contact tracking is always ongoing, when a user triggers an SOS alarm, the *SOS Alarm Payload* will include information about the wearer's last close contact before the alarm and the location information at current time.

Note: Users can choose whether to include location information in the *SOS Alarm Payload*.



3.2 Bluetooth Capabilities

3.2.1 Bluetooth Advertise

When user turn on the LW004-CT, the LW004-CT will constantly Bluetooth broadcast unless the device is set to the unconnected state.

When the device is unconnected, the device will only broadcast for one minute after each reboot.

The user can scan the LW004-CT and establish a link with the LW004-CT through the Bluetooth function of the cell phones, iPad, etc. After the Bluetooth connection is established, the user can use the MKLoRa APP to set the parameters and upgrade the firmware of the LW004-CT.

Note: About the MKLoRa app, pls refer to [LW004-CT APP Guide](#).

The broadcast content of LW004-CT is divided into broadcast packet and response packet. The following is an example of the broadcast content:

LW004-CT (iBeacon)
 D3:64:40:05:4A:1C
 NOT BONDED -73 dBm ↔ N/A

CONNECT

Device type: LE only
 Advertising type: Legacy
 Flags: GeneralDiscoverable, BrEdrNotSupported

Beacon:
 Company: Apple, Inc. <0x004C>
 Type: Beacon <0x02>
 Length of data: 21 bytes
 UUID: e2c56db5-dffb-48d2-b060-d0f5a71096e0
 Major: 0
 Minor: 0
 RSSI at 1m: -65 dBm

Service Data: UUID: 0xAA01 Data:
 0x0100000000BF000E64D36440054A1C
 Complete Local Name: LW004-CT

CLONE **RAW** **MORE**

Raw data:

```
0x0201061AFF4C000215E2C56DB5DFFB48
D2B060D0F5A71096E00000000BF121601
AA0100000000BF000E64D36440054A1C09
094C573030342D4354
```

Details:

LEN.	TYPE	VALUE
2	0x01	0x06
26	0xFF	0x4C000215E2C56DB5DFFB48D2B060D0F5A71096E00000000BF
18	0x16	0x01AA0100000000BF000E64D36440054A1C
9	0x09	0x4C573030342D4354

LEN. - length of EIR packet (Type + Data) in bytes,
 TYPE - the data type as in <https://www.bluetooth.org/en-us/specification/assigned-numbers/generic-access-profile>

OK

3.2.1.1 Broadcast Packet

LEN	TYPE	VALUE
2	0x01	0x06
26	0xFF	0x4C 00 02 15 E2 C5 6D B5 DF FB 48 D2 B0 60 D0 F5 A7 10 96 E0 00 00 00 00 BF

- UUID: E2C56DB5-DFFB-48D2-B060-D0F5A71096E0
- Major:0 (0x00 00)
- Minor:0 (0x00 00)
- RSSI@1m: -65dBm (0xBF)

3.2.1.2 Response Packet

LEN	TYPE	VALUE
18	0x16	0x01 AA 01 00 00 00 00 BF 00 0E 64 D3 64 40 05 4A 1C
9	0x09	0x4C 57 30 30 34 2D 43 54

- Service UUID: 0x AA 01
- Device Type: LW004-CT (0x01)
- Major: 0 (0x00 00)
- Minor: 0 (0x00 00)
- RSSI@1m: -65dBm (0xBF)
- Tx Power: 0 dBm (0x00)
- Device Status: 0x0E (0x0E = 0b0000 1110)
 - Bit3(1 means connectable state; 0 means not connectable state)
 - Bit2(1 means Scan open; 0 means Scan close)
 - Bit1(1means with 3-axis; 0 means without 3-axis)
 - Bit0(1 means with; 0 means without Flash)

- Battery Level: 100% (0x64)
- MAC Address: D3 64 40 05 4A 1C (0xD3 64 40 05 4A 1C)
- Device ADV Name: LW004-CT (0x4C 57 30 30 34 2D 43 54)

3.2.2 Bluetooth Scan

When scan switch status is on, the device will start to scan beacons nearby and cache the beacon information that meets the conditions.

Users can set the scanning intensity according to different application scenarios, a total of three levels of high, medium and low can be set.

Note: The intensity of the Bluetooth scan affects the broadcast performance of the device. If the broadcast performance of the device is found to be affected, it is recommended to reduce the ADV Interval of the device, but this will increase the power consumption of the device.

The Bluetooth scanning function of LW004-CT has two main parts: *Contact Tracking Scanning* and *Location Beacon Scanning*. They will not affect each other.

3.2.2.1 Contact Tracking Scanning

Contact Tracking Scanning is mainly used to scan the LW004-CT worn by others. By scanning the device data of LW004-CT, the information of people in close contact with the user can be recorded.

The following is the specific description of *Contact Tracking Scanning* rules:

- ① There are two sets of filter conditions, one is Filter Condition A, and other one is Filter Condition B. Each filter condition has a separate switch setting, which can be arbitrarily switched on or off.
- ② When both of Filter Condition A and Filter Condition B are switched on, the relationship between two sets of filter conditions can be set as AND or OR.

AND: Beacon information is stored and reported only when the data meets both Filter Condition A and Filter Condition B.

OR: Beacon information is stored and reported when the beacon data meets either filter condition A or filter condition B.

If only one condition is opening, the data that meets this filter condition will be saved and uploaded.

Note: When both Condition A and Condition B are off, the Contact Tracking Scanning function can continue to work without filtering conditions.

- ③ There are seven filter items in each set of filter conditions, which are RSSI Filter, MAC Address

Filter, UUID Filter, ADV Name Filter, Major Filter, Minor Filter and Raw Data Filter. Only if these seven filter items are met at the same time can this filter condition be considered to be met.

Each filter item can be set to off, positive filter and reverse filter.

- ✧ Off: Regardless of this filter item.
- ✧ Positive filter: If the device being scanned matches the content of this filter item, it is considered to meet the filter item.
- ✧ Reverse filter: If the device being scanned does not match the contents of this filter item, it is considered to meet the filter item.

Note: For the RSSI Filter item, it can't be set to positive filter. Refer to [LW004-CT APP Guide](#) for detailed Settings of filter items and an example.

3.2.2.1 Location Beacon Scanning

Location Beacon Scanning is mainly used to scan the fixed location beacon. By scanning the broadcast content of location beacon, the approximate location of the close contact can be recorded and analyzed.

The following is the specific description of *Location Beacon Scanning* rules:

- ① There are two sets of filter conditions, one is Filter Condition A, and other one is Filter Condition B. Each filter condition has a separate switch setting, which can be arbitrarily switched on or off.
- ② When both of Filter Condition A and Filter Condition B are switched on, the relationship between two sets of filter conditions can be set as AND or OR.

AND: Beacon information is stored and reported only when the data meets both Filter Condition A and Filter Condition B.

OR: Beacon information is stored and reported when the beacon data meets either filter condition A or filter condition B.

If only one condition is opening, the data that meets this filter condition will be saved and uploaded.

Note: When both Condition A and Condition B are off, the *Location Beacon Scanning* function will stop working and stop reporting Location information.

- ③ There are seven filter items in each set of filter conditions, which are RSSI Filter, MAC Address Filter, UUID Filter, ADV Name Filter, Major Filter, Minor Filter and Raw Data Filter. Only if these seven filter items are met at the same time can this filter condition be considered to be met.

Each filter item can be set to off, positive filter and reverse filter.

- ✧ Off: Regardless of this filter item.
- ✧ Positive filter: If the device being scanned matches the content of this filter item, it is considered to meet the filter item.

- ✧ Reverse filter: If the device being scanned does not match the contents of this filter item, it is considered to meet the filter item.

Note: For the RSSI Filter item, it can't be set to Reverse filter. Refer to [LW004-CT APP Guide](#) for detailed Settings of filter items and an example.

3.2.2.2 Filter Repeating Data

Since each Bluetooth device (LW004-CT and Location Beacons) may be scanned and saved more than once in a scan cycle, we opened up the filtering of duplicate data. With this feature, for the same data, we report only once in the same reporting cycle, and the data reported is the most recently scanned.

Both [Contact Tracking Scanning](#) and [Location Beacon Scanning](#) have this function.

There are four types of Filter Repeating Data:

No: Don't do anything.

MAC: Beacon data with the same MAC will only be reported once in the same cycle

MAC + Data Type: Beacon data with the same MAC and the same beacon data type will only be reported once in the same cycle. Common data types are IBEACONS, Eddystone and AltBeacon.

MAC + Raw Data: Beacon data with the same MAC address and raw data will only be reported once in the same cycle.

Note: Some beacons have multiple slots and each slot can broadcast different types of data and different content. Through the Filter Repeating Data, users can better get the data they want.

3.3 LoRaWAN Capabilities

The data of LW004-CT will be transmitted via LORA and LW004-CT is based on the standard LoRaWAN protocol V1.0.3.

LW004-CT is compatible with mainstream gateways and mainstream servers (TTN, SENET, LORA IOT, etc.) in the market.

Link Check MAC Commands: LW004-CT supports LinkCheck function. Users can use this function to realize regular network monitoring function and confirm the network status of the device.

Device Time MAC Commands: LW004-CT supports the DeviceTime feature, which enables users to periodically time their devices to avoid time offset. The *Time Sync Interval* of the MKLoRa APP is the Device Time MAC Command interval. (Please refer to [LW004-CT APP Guide](#))

Note: Some LoRa Server platforms did not support LinkCheck and DevicTtime function, for example TTN server, if you want use device in these platforms, should set the corresponding Settings item to 0.

3.4 3-Axis Accelerometer Capabilities

LW004-CT has built-in 3-Axis accelerometer sensor LIDSHTR.

The 3-Axis function is on by default. When the device moves, if it reaches the trigger threshold, the device is considered to enter the movement status. In the movement status, the device will periodically report the 3-Axis payload.

Customers can set LIDSHTR's parameters and analyze 3-Axis payloads for additional application development.

Note: For the parameter setting of the 3-axis function, please refer to LW004-CT APP Guide.

3.4 Device Status Indication

Because of the impact of power consumption, LW004-CT is not designed to have a dedicated indicator to indicate that the device is on.

Therefore, we have designed the device status to be briefly indicated by button triggering.

When the device is on, double click the on/off button twice within 1s, Solid Green and keep one second means that the device is on, otherwise the device is off.

Note: When the on/off indication is triggered, the device will temporarily increase the broadcast interval to 100ms at the same time, so that users can connect to the device faster via Bluetooth.

3.5 Device Information Upload

The device will periodically report the *Device Information Payload*. The default report interval is 4H.

The *Device Information Payload* contains mainly battery level, SOS Alarm Function Enable Switch Status, MAC address and ADV name.

3.6 Battery Performance

The LW004-CT is equipped with a 540 rechargeable battery.

With batteries, typical lifetime in a close tracking scenario is around two days (Scan intensity: medium, Report Interval:3 minutes).

3.7 Time Synchronization

There are two methods to sync time through the MKLoRa APP or DeviceTime MAC Command

function.

When the APP connect with the device success the phone system time will be sync to the device.

Device Time MAC Commands: LW004-CT supports the DeviceTime feature, which enables users to periodically time their devices to avoid time offset.

3.8 Configuration Tool

The device can use MKLoRa app developed by Moko for quick OTA upgrades and parameter settings. About the detail of MKLoRa, pls refer to [LW004-CT APP Guide](#).

4 Uplink Payload

This section describes the payload messages supported by the LW004-CT. There are five types of data reported through LoRa.

4.1 Device Information Payload

The LW004-CT will report the equipment information packet regularly, the default report interval is 4 hours.

Byte Index	Type	Data	Value	Description
Byte0	Payload Type	Uint	0x02	02 means Device Information Payload.
Byte1	Battery Level	Uint	0x00-0x64	Convert to decimal, unit is %.
Byte 2	Alarm Enable Setting	Uint	0x00 – 0x01	00 means disable; 01 means enable.
Byte 3 - 8	The host MAC	Uint	0X000000000000-0XFFFFFFFFFFFF	The byte order is Big-Endian. Example: B1 FA 1E 36 EF 03, the real MAC address is B1 FA 1E 36 EF 03. The host refers to the LW004-CT that reports the data.
Byte 9 - 10	The hardware version of LW004-CT	Uint	0X0000 - 0XFFFF	Example: If it is 0x21 0A, the hardware version is V2.1.10.
Byte 11- 20	ADV Name of LW004-CT	Uint	0X00000000000000000000 - 0XFFFFFFFFFFFFFFF	Convert to ASCII.

4.2 Contact Tracing Payload

- Users can choose to report content according to application scenarios.
- The smaller the number of bytes per payload, the shorter the transmission time and the lower the power consumption
- The optional reported contents are as follows:
 - ① Battery Level
 - ② The host MAC
 - ③ The MAC and RSSI of Location Beacons
 - ④ The Raw data of the slave device

Byte Index	Type	Data Type	Value	Description
Byte0	Payload Type	Uint	0x00	00 means Contact Tracing Payload
Byte1	Battery Level	Uint	0x00-0x64	Convert to decimal, unit is %.
Byte 2 – 8	Timestamp	Uint	0X0000000000000000-0xFFFFFFFFFFFFFFF	Convert to decimal. Byte 2-3 represents the year; Byte 4 represents the month; Byte 5 represents the date; Byte 6 represents the hour; Byte 7 represents minute; Byte 8 represents second;
Byte 9 - 14	The host MAC	Uint	0X00000000000000-0xFFFFFFFFFFFFFFF	The byte order is Big-Endian. Example: B1 FA 1E 36 EF 03, the real MAC address is B1 FA 1E 36 EF 03. The host refers to the LW004-CT that reports the data.
Byte 15 - 20	MAC address of the slave device	Uint	0X00000000000000-0xFFFFFFFFFFFFFFF	The byte order is Big-Endian. Example: B1 FA 1E 36 EF 03, the real MAC address is B1 FA 1E 36 EF 03. The slave refers to the device in emergency contact with the host.
Byte 21	RSSI of the slave device	Int	0X00-0XFF	Converts directly to decimal numbers, then Minus 256. The unit is dBm.

Byte 22 - XX	Raw data of the slave device	Uint		The slave refers to the device in close contact with the host.
Byte XX-(XX+5)	MAC address of 1 st Location Beacon	Uint	0X000000000000-0XFFFFFFFFFFFF	The byte order is Big-Endian. Example: B1 FA 1E 36 EF 03, the real MAC address is B1 FA 1E 36 EF 03.
Byte (XX+6)	RSSI of 1 st Location Beacon	Int	0X00-0XFF	Converts directly to decimal numbers, then Minus 256. The unit is dBm.
Byte (XX+7)-(XX+12)	MAC address of 2nd Location Beacon	Uint	0X000000000000-0XFFFFFFFFFFFF	The byte order is Big-Endian. Example: B1 FA 1E 36 EF 03, the real MAC address is B1 FA 1E 36 EF 03.
Byte (XX+13)	RSSI of 2nd Location Beacon	Int	0X00-0XFF	Converts directly to decimal numbers, then Minus 256. The unit is dBm.
Byte (XX+14) – (XX+19)	MAC address of 3rd Location Beacon	Uint	0X000000000000-0XFFFFFFFFFFFF	The byte order is Big-Endian. Example: B1 FA 1E 36 EF 03, the real MAC address is B1 FA 1E 36 EF 03.
Byte (XX+20)	RSSI of 3rd Location Beacon	Int	0X00-0XFF	Converts directly to decimal numbers, then Minus 256. The unit is dBm.
Byte (XX+21) – (XX+26)	MAC address of 4th Location Beacon	Uint	0X000000000000-0XFFFFFFFFFFFF	The byte order is Big-Endian. Example: B1 FA 1E 36 EF 03, the real MAC address is B1 FA 1E 36 EF 03.
Byte (XX+27)	RSSI of 4 th Location Beacon	Int	0X00-0XFF	Converts directly to decimal numbers, then Minus 256. The unit is dBm.

4.3 Distance Alarm Payload

- Users can choose to report content according to application scenarios.

- The smaller the number of bytes per payload, the shorter the transmission time and the lower the power consumption.
- The optional reported contents are as follows:
 - ① Battery Level
 - ② The host MAC
 - ③ The MAC and RSSI of Location Beacons
 - ④ The Raw data of the slave device

Byte Index	Type	Data Type	Value	Description
Byte0	Payload Type	Uint	0x01	01 means Distance Alarm Payload
Byte1	Battery Level	Uint	0x00-0x64	Convert to decimal, unit is %.
Byte 2 – 8	Timestamp	Uint	0X0000000000000000-0xFFFFFFFFFFFFFFF	Convert to decimal. Byte 2-3 represents the year; Byte 4 represents the month; Byte 5 represents the date; Byte 6 represents the hour; Byte 7 represents minute; Byte 8 represents second;
Byte 9 - 14	The host MAC	Uint	0X000000000000-0xFFFFFFFFFFFFFFF	The byte order is Big-Endian. Example: B1 FA 1E 36 EF 03, the real MAC address is B1 FA 1E 36 EF 03. The host refers to the LW004-CT that reports the data.
Byte 15 - 20	MAC address of the slave device	Uint	0X000000000000-0xFFFFFFFFFFFFFFF	The byte order is Big-Endian. Example: B1 FA 1E 36 EF 03, the real MAC address is B1 FA 1E 36 EF 03. The slave refers to the device in emergency contact with the host.
Byte 21	RSSI of the slave device	Int	0X00-0XFF	Converts directly to decimal numbers, then Minus 256. The unit is dBm.
Byte 22 - XX	Raw data of the slave device	Uint		The slave refers to the device in close contact with the host.

Byte XX-(XX+5)	MAC address of 1 st Location Beacon	Uint	0X000000000000-0XFFFFFFFFFFFF	The byte order is Big-Endian. Example: B1 FA 1E 36 EF 03, the real MAC address is B1 FA 1E
Byte (XX+6)	RSSI of 1 st Location Beacon	Int	0X00-0XFF	Converts directly to decimal numbers, then Minus 256. The unit is dBm.
Byte (XX+7)-(XX+12)	MAC address of 2nd Location Beacon	Uint	0X000000000000-0XFFFFFFFFFFFF	The byte order is Big-Endian. Example: B1 FA 1E 36 EF 03, the real MAC address is B1 FA 1E
Byte (XX+13)	RSSI of 2nd Location Beacon	Int	0X00-0XFF	Converts directly to decimal numbers, then Minus 256. The unit is dBm.
Byte (XX+14) – (XX+19)	MAC address of 3rd Location Beacon	Uint	0X000000000000-0XFFFFFFFFFFFF	The byte order is Big-Endian. Example: B1 FA 1E 36 EF 03, the real MAC address is B1 FA 1E
Byte (XX+20)	RSSI of 3rd Location Beacon	Int	0X00-0XFF	Converts directly to decimal numbers, then Minus 256. The unit is dBm.
Byte (XX+21) – (XX+26)	MAC address of 4th Location Beacon	Uint	0X000000000000-0XFFFFFFFFFFFF	The byte order is Big-Endian. Example: B1 FA 1E 36 EF 03, the real MAC address is B1 FA 1E
Byte (XX+27)	RSSI of 4 th Location Beacon	Int	0X00-0XFF	Converts directly to decimal numbers, then Minus 256. The unit is

4.4 SOS Alarm Payload

- Users can choose to report content according to application scenarios.
- The smaller the number of bytes per payload, the shorter the transmission time and the lower the power consumption.
- The optional reported contents are as follows:
 - ① Timestamp
 - ② The host MAC
 - ③ The MAC and RSSI of Location Beacons

Byte Index	Type	Data Type	Value	Description
Byte0	Payload Type	Uint	0x05	05 means SOS Alarm Payload
Byte1	Battery Level	Uint	0x00-0x64	Convert to decimal, unit is %.
Byte 2 – 8	Timestamp	Uint	0X0000000000000000-0xFFFFFFFFFFFFFFF	Convert to decimal. Byte 2-3 represents the year; Byte 4 represents the month; Byte 5 represents the date; Byte 6 represents the hour; Byte 7 represents minute; Byte 8 represents second;
Byte 9 - 14	The host MAC	Uint	0X000000000000-0xFFFFFFFFFFFFFFF	The byte order is Big-Endian. Example: B1 FA 1E 36 EF 03, the real MAC address is B1 FA 1E 36 EF 03. The host refers to the LW004-CT that reports the data.
Byte 15 - 20	MAC address of the slave device	Uint	0X000000000000-0xFFFFFFFFFFFFFFF	The byte order is Big-Endian. Example: B1 FA 1E 36 EF 03, the real MAC address is B1 FA 1E 36 EF 03. The slave refers to the device in emergency contact with the host.
Byte 21	RSSI of the slave device	Int	0X00-0XFF	Converts directly to decimal numbers, then Minus 256. The unit is dBm.
Byte 22-27	MAC address of 1 st Location Beacon	Uint	0X000000000000-0xFFFFFFFFFFFFFFF	The byte order is Big-Endian. Example: B1 FA 1E 36 EF 03, the real MAC address is B1 FA 1E 36 EF 03.
Byte 28	RSSI of 1 st Location Beacon	Int	0X00-0XFF	Converts directly to decimal numbers, then Minus 256. The unit is dBm.
Byte 29 - 34	MAC address of 2nd Location Beacon	Uint	0X000000000000-0xFFFFFFFFFFFFFFF	The byte order is Big-Endian. Example: B1 FA 1E 36 EF 03, the real MAC address is B1 FA 1E 36 EF 03.

Byte 35	RSSI of 2nd Location Beacon	Int	0X00-0XFF	Converts directly to decimal numbers, then Minus 256. The unit is dBm.
Byte 36 - 41	MAC address of 3rd Location Beacon	Uint	0X000000000000-0XFFFFFFFFFFFF	The byte order is Big-Endian. Example: B1 FA 1E 36 EF 03, the real MAC address is B1 FA 1E 36 EF 03.
Byte 42	RSSI of 3rd Location Beacon	Int	0X00-0XFF	Converts directly to decimal numbers, then Minus 256. The unit is dBm.
Byte 43 - 48	MAC address of 4th Location Beacon	Uint	0X000000000000-0XFFFFFFFFFFFF	The byte order is Big-Endian. Example: B1 FA 1E 36 EF 03, the real MAC address is B1 FA 1E 36 EF 03.
Byte 49	RSSI of 4 th Location Beacon	Int	0X00-0XFF	Converts directly to decimal numbers, then Minus 256. The unit is dBm.

4.5 3-Axis Payload

- Users can choose to report content according to application scenarios.
- The smaller the number of bytes per payload, the shorter the transmission time and the lower the power consumption.
- The optional reported contents are as follows:
 - ① Timestamp
 - ② The host MAC

Byte Index	Type	Data Type	Value	Description
Byte0	Payload Type	Uint	0x03	03 means SOS Alarm Payload
Byte 1 – 7	Timestamp	Uint	0X0000000000000000-0xFFFFFFFFFFFFFF	Convert to decimal. Byte 1-2 represents the year; Byte 3 represents the month; Byte 4 represents the date; Byte 5 represents the hour; Byte 6 represents minute; Byte 7 represents second;

Byte 8 - 13	The host MAC	Uint	0X000000000000- 0XFFFFFFFFFFFF	The byte order is Big-Endian. Example: B1 FA 1E 36 EF 03, the real MAC address is B1 FA 1E 36 EF 03. The host refers to the LW004-CT that reports the data.
Byte 14 - 15	X-axis acceleration	Int	0x0000 – 0x FFFF	This is a signed value. Convert to decimal, the unit is mg.
Byte 16 - 17	Y-axis acceleration	Int	0x0000 – 0x FFFF	This is a signed value. Convert to decimal, the unit is mg.
Byte 18 - 19	Z-axis acceleration	Int	0x0000 – 0x FFFF	This is a signed value. Convert to decimal, the unit is mg.

5 Maintenance instruction


- Do not use or store the device in dusty or dirty areas.
- Do not use or store the device in extremely hot temperatures. High temperatures may damage the device or battery.
- Do not use or store the device in extremely cold temperatures .when the device warms to its normal temperature, moisture can form inside the device and damage the device or battery.
- Do not drop ,knock, or shake the device. Rough handing would break it.
- Do not use strong chemicals or washing to clean the device.
- Do not paint the device ,paint would cause improper operation
- Do not disassemble the device casually or use the tools for maintenance without permission


Handle your device, battery and accessories with care. The suggestions above help you keep your device operational.

6 Revision History

Version	Description	Editor	Date
1.0	Initial version	Allen	2020-08-18
1.1	Update LoRa Tracker APP content and Add Downlink Command & Maintenance Instruction	Allen	2020-10-26
2.1	Suitable for firmware version V2.1.8 &HW Version V1.5	Allen	2021-06-08

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