Document Number: 990-01201
Rev. 2.12
contact@lansitec.com

1. General Introduction

The BLE Gateway is designed based on BLE and LoRa technology. With the advanced LoRa technology and built-in BLE module, the BLE gateway receives the BLE devices' messages and reports them to the LoRa gateway. The parameter settings, such as the heartbeat period, LoRa work mode, and bytes to send in a BLE message, are adjustable as per customers' requirements.

This document applies to the following products:

Table 1: Product List

Name	Product Description
Indoor BLE Gateway	BLE 5.0, 120 x 120 x 31 mm, 5V
Compact BLE Gateway	BLE 5.0, 97 x 62 x 7 mm, 600 mAh, 5V
Solar BLE Gateway	BLE 5.0, built-in antenna, solar, 150 x 90 x 60 mm, 5300 mAh
Macro BLE Gateway	BLE 5.0, build-in antenna, 150 x 90 x 60 mm, 38000 mAh

2. Abbreviation

- **ABP**: Activation by Personalization
- **AS**: Application Server
- **BLE**: Bluetooth Low Energy
- **CRC**: Cyclic Redundancy Check
- **LoRa**: Long Range modulation technique
- **LoRaWAN**: LoRa Wide Area Network
- **OTAA**: Over the Air Activation
- **RFU**: Reserved for Future Usage
- **RSSI**: Received Signal Strength Indicator

Product Specifications

Table 2: Product Specifications

LoRaWAN

Protocol	Version 1.0.2B
Activation Mode	OTAA or ABP
LoRa Frequency	US915, AU915, EU868, EU433, AS920-923, AS923-925, RU864, ID920, KR920, IN865, KZ865, CN470, CN470-Ali
LoRa TX power	0 to 20dBm
LoRa Sensitivity	-139dBm @SF12, BW 125kHz, 434MHz/470MHz -137dBm @SF12, BW 125kHz, 868MHz/915MHz
LoRa Communication Distance	>1.5km in the urban area
Encryption	AES128

Bluetooth

Protocol	Bluetooth 5.0
TX Power	4, 0, -4, -8, -12, -16, -20dBm
Sensitivity	-96dBm
Receiving Range	100m

System and Mechanical

Parameter	Indoor BLE Gateway	Compact BLE Gateway	Solar BLE Gateway	Macro BLE Gateway
Picture				
Operating Current	6mA @ Bluetooth receiving Max. 140mA @ 20dBm			
Operating Temperature	-40°C ~ + 70°C	-10°C ~ + 60°C	-40°C ~+ 70°C	-40°C ~+ 70°C
Charging Temperature	N/A	0°C ~ + 40°C	-20°C ~+ 60°C	N/A
Storage Temperature	-50°C ~+ 85°C	-40°C ~ + 85°C	-50°C ~+ 85°C	-50°C ~+ 85°C
Operating Humidity	5% ~ 95%			
Battery	N/A	Li-ion 600mAh rechargeable	Li-ion 5300mAh, Lithium rechargeable	Lithium thionyl chloride non-chargeable battery, 2 x 19,000mAh
Power	DC 5V/1A	DC 5V/1A	Solar-powered	Do NOT charge this product and battery
Dimension	120 x 120 x 31 mm	97 x 62 x 7 mm	150 x 90 x 62 mm	150 x 90 x 60 mm

3. Application Information

3.1 Function

3.1.1 LoRa Function

The gateway supports both OTAA and ABP modes. The indoor gateway and compact gateway work on class C mode while the outdoor or macro gateway work on class A mode. DevEUI, AppEUI, and AppKey, or

DevAddr, NwkSKey, and AppSKey are stored in the gateway and are necessary for joining a network. Please find DevEUI or DevAddr labeled at the back of the device. Lansitec helps to configure these parameters before shipping if required. The gateway sends a registration message that includes the gateway's current parameters setting to the Application Server (AS) after it joins the network.

It reports the heartbeat message to AS periodically. The heartbeat period is configurable to be an integral multiple of 30 seconds. The default HB period is 5 minutes. Heartbeat message also contains status information of the gateway. AS can use it to monitor the gateway.

The BLE gateway forwards BLE devices received and forwards the corresponding information to the LoRaWAN gateway. If it receives a device multiple times in one Bluetooth receiving period, it only reports the latest one.

Please refer to:
990-00169 " B-Mobile Personnel & Asset Tracking Solution" to find out how to design and develop your tracking system.

3.1.2 Bluetooth Function

The Bluetooth gateway filters the data in a Bluetooth beacon payload and sends any data in the 31 bytes payload to the LoRaWAN gateway. It supports reporting a maximum of 3 types of beacons and caches a maximum of 105 beacons (all 3 types combined). It filters each beacon with 3 blocks of data (Payload Filter Block) maximum and reports 10 data blocks maximum in its payload. When corresponding data in a beacon's payload matches the ones defined in the Payload Filter Block/Blocks, the gateway reports the data in the range of the Data Blocks. Refer to **3.4.3 Rule Report** for details.

3.2 Application Scenarios

The gateway follows the general rules below:

- When a registration request is received from the gateway,
  - If AS only wants the gateway to work with default parameters, AS ignores the registration message and waits for the periodic report.
  - Or AS records the first-time configuration and acknowledges the request. If AS contains some history configuration of the gateway and a mismatch occurs, AS should send the new configuration to the gateway. Thereafter, the gateway updates and starts working with the new parameters.

After registration, the user can change the configuration of the gateway.
In case the gateway resets after registration, or when receiving a periodical heartbeat message, AS needs to check if any configuration mismatch occurs. If necessary, AS should send the new configuration to the gateway in the next downlink window.

3.3 On/Off and LED Status

3.3.1 Indoor BLE Gateway

1) Turn on: Plug in the charger, the red LED flashes four times, while the green LED is on. Then the green LED is off, and the red LED is on.

2) Turn off: Unplug the charger.
3) Joining the network: The green LED is on.
4) LoRa communication: The green LED flashes once with every LoRa communication.

3.3.2 Compact BLE Gateway

1) Turn on: Long press the button for four seconds, and the red LED flashes four times while the green LED is on.
2) Turn off: Long press the button for four seconds, and the red LED is “on” for four seconds and then turns off.
3) Reboot: LED status is the same as turning on.
4) Joining the network: The green LED is on.
5) After joining the network, press the button once:
   a) Green LED is on: Successfully joined.
   b) Green LED is off: Joining failed, or the gateway is in the off state.
6) In the ON state, press the button three times, the green LED blinks three times, and the gateway rejoins the network.
7) Charge: Red LED flashes every second.
8) Charge done: Solid red LED.

3.3.3 Macro Bluetooth Gateway & Solar BLE Gateway

1) Turn on: Long press the power on button for 3-5 seconds until the gateway beeps once.
   Find the power button on the sidebar, labeled with Power On/Off label.
2) Turn off: Long press the power on button for 3-5 seconds until the gateway beeps 3 times.
3) Joining the network: No sign, please check the packets in the network server.

3.4 Uplink Message

Table 3: Uplink Message Table

Message Type	Name	Description
0x1	Registration	The gateway will send this message once when joined the LoRa network successfully or when a specific command request downlink message is received.
0x2	Heartbeat	The gateway will periodically send this message to confirm the status of the Lora network connection.
0x3	Rule Report	The gateway filters UUIDs of 3 types of beacons and reports their majors and minors in default. Beacon type 1, UUID: F2-A5-2D-43-E0-AB-48-9C-B6-4C-4A-83-00-14-67-20 Beacon type 2, UUID: F2-A5-2D-43-E0-AB-48-9C-B6-4C-4A-83-00-14-67-21 Beacon type 3, UUID: F2-A5-2D-43-E0-AB-48-9C-B6-4C-4A-83-00-14-67-22
0x8	Type1 Beacon	The gateway reports the message according to 3.4.4 Type 1 Beacon

	Uplink Message	Uplink Message.
0x9	Type2 Beacon Uplink Message	The gateway reports the message according to 3.4.5 Type 2 Beacon Uplink Message.
0xA	Type3 Beacon Uplink Message	The gateway reports the message according to 3.4.6 Type 3 Beacon Uplink Message.
0xE	Multi Types of Beacons	The gateway reports the message according to the message body if more than one type of beacon is received as described in 3.4.7 Multi Types of Beacons.

3.4.1 Registration

Bytes	**1**	**1**	**1**	**1**	**2**	**1**
Item	Type	SMODE	POWER	CFG	POS	HB

Type Field (the most significant byte)

Bit	**Name**	**Value**	**Description**
7~4	Type	0x1	Message type. AS uses it to identify different uplink messages. Bit7 is the significant bit.
3	ADR	0: OFF 1: ON	ADR (Adaptive Data Rate) status. The default value is OFF. When ADR is enabled, the maximum payload length is as listed **in Table 5: LoRa Data Rate and Payload Length Limitation Map (bytes)**
2~0	MODE	0x01~0x07	The current working LoRa frequency sub-band plan should be one of SMODE. 0x1: AU915 0x3: CN470 0x4: AS923 0x5: EU433 0x6: EU868 0x7: US915

SMODE Field

Bit	**Name**	**Value**	**Description**
7~0	SMODE	0x01: AU915 0x04: CN470 0x08: AS923 0x10: EU433 0x20: EU868 0x40: US915	LoRa frequency band plan. This field is reserved by Lansitec and will be configured before shipping. Default value: European market: EU868 China market: CN470 Southeast Asian market: AS923 American market US915. Currently, it only supports one mode.

POWER Field

Bit	**Name**	**Value**	**Description**

7~3	POWER	0~20	LoRa transmits power (dBm). The default value depends on the gateway LoRa frequency work mode, and it's the largest allowed. For example, if the mode is EU868, the default value of POWER should be 16 dBm. For detailed setting information, please refer to **Table 4: LoRa TRANSMITTING POWER (dBm)** for details.
2~0	Reserved	0x0	Reserved for future use.

Table 4: LoRa TRANSMITTING POWER (dBm)

EU868	US915	AU915	CN470	AS923	KR920	IN865	STE920
16	20	20	20	16	14	20	20
14	18	18	18	14	12	18	18
12	16	16	16	12	10	16	16
10	14	14	14	10	8	14	14
8	12	12	12	8	6	12	12
6	10	10	10	6	4	10	10
4	8	8	8	4	2	-	-
2	6	6	6	2	-	-	-

CFG Field

Bit	Name	Value	Description
7~4	DR	3~5	Data Rate (DR3~DR5). The default value is DR3
3~0	Reserved	0x0	Reserved for future use.

Table 5: LoRa Data Rate and Payload Length Limitation Map (bytes)

DR	EU868	US915	EU433	AU915	CN470	AS923	KR920	IN865	STE920
0	51	11	51	51	51	51	65	51	51
1	51	53	51	51	51	51	151	51	51
2	51	126	51	51	51	51	242	51	51
3	115	242	115	115	115	115	242	115	115
4	242	242	242	242	242	242	242	242	242
5	242	-	242	242	242	242	242	242	242

POS Field

Bit	Name	Value	Description
15~0	POS	0~65535	Report interval, unit 5s. 0 means OFF. (Big endian) The default value is 10s. According to this interval, the gateway sends uplink messages with beacons' info or sensors' data to AS.

For indoor or compact gateway, Bluetooth keeps receiving all the time and sends the beacon info list at the end of the POS period. It only sends 15 Bluetooth beacons at a time. If more are received, other beacons are stored in the buffer and sent through the following messages. If more beacons are received in the next period, the new beacons are placed at the end of the buffer. The stored beacons received in the previous period are to be sent on a priority bias. If a few beacons are received but are not sent in the current cycle, and received again in the next cycle, their information will be renewed and sent. Moreover, they will not

be placed at the tail of the message.

If many beacons were received and the gateway can't report all of them in one interval, it will report them 10s later until all are reported.

HB Field

Bit	Name	Value	Description
7~0	HB	1~255	Heartbeat interval, unit 30s. Heartbeat can't be disabled. The default value is 10, i.e., 5 minutes.

3.4.2 Heartbeat

Bytes	**1**	**1**	**1**	**2**	**2**	**1**
Item	Type	VOL	RSSI	SNR	REV	CHGSTAT

Type Field

Bit	Name	Value	Description
7~4	Type	0x2	Message type, AS uses it to identify different uplink messages.
3~0	RFU	0x1	Reserved for future use.

VOL Field

Bit	Name	Value	Description
7~0	VOL	Macro Gateway 0~100	Battery level in percentage. It indicates how much is left. (Unit: %)
		Solar & Compact Gateway 0~100	Battery level in percentage. It indicates how much is left. (Unit: %)
		Indoor Gateway	Battery level in percentage. It indicates how much is left. (Unit: %)

RSSI Field

Bit	Name	Value	Description
7~0	RSSI	0~160	The downlink Received Signal Strength Indication, was detected and calculated by the gateway. (unit: -1dBm)

SNR Field

Bit	Name	Value	Description
15~0	SNR	-3000~3000	Signal Noise Ratio, *0.01, i.e., -30.00~30.00

REV Field

Bit	Name	Value	Description
15 ~ 0	REV	16-bit hex	Firmware version

CHGSTAT Field

Bit	Name	Value	Description
7~0	CHGSTAT	Compact & Solar Gateway 0x0: Not charging	Status of charging

		0x5: Charging 0x6: Charging completed	
		Macro Gateway	This field remains 0x0, and can't be changed.
		Indoor Gateway	This field remains 0x0, and can't be changed.

3.4.3 Rule Report

The gateway reports 1 type of beacon at a time.

Bytes	**1**	**1**	**1**	**3~23**				.....
Item	Message Type	Beacon Type	Payload Block Type	1	1	1	0~20	.....
				Rule Type	Start Address	End Address	Filter Value	.....

The gateway filters UUIDs of 3 types of beacons and reports their majors and minors in default.

Beacon type 1, UUID: F2-A5-2D-43-E0-AB-48-9C-B6-4C-4A-83-00-14-67-20

Beacon type 2, UUID: F2-A5-2D-43-E0-AB-48-9C-B6-4C-4A-83-00-14-67-21

Beacon type 3, UUID: F2-A5-2D-43-E0-AB-48-9C-B6-4C-4A-83-00-14-67-22

Message Type Field

Bit	**Name**	**Value**	**Description**
7 ~ 4	Message Type	0x3	LoRa uplink or downlink message type. Bit7 is the most significant bit.
3 ~ 0	RFU	0x0	Reserved for Future Use

Beacon Type Quantity Field

Bit	**Name**	**Value**	**Description**
7 ~ 0	Beacon Type Quantity Field	0x0~0x3	The gateway supports reporting a maximum of 3 types of beacons. The gateway does not report any Bluetooth payload if this number is 0 and only reports heartbeat messages.

Payload Block Field

Bit	**Name**	**Value**	**Description**
7 ~ 4	Beacon Type ID	0x1~0x3	This field represents the ID of each type of beacon.
3 ~ 0	Filter and Data Block Quantity	0x1~0xD	Total number of filter and data blocks

Rule Type Field

Bit	**Name**	**Value**	**Description**
7 ~ 0	Rule Type	0x01: Payload Filter Block 0x02: Data Block	Indicate the type of the following data. 0x01: Indicate the following data is the start address, end address, and data to be filtered for this Payload Filter Block. 0x02: Indicate the following data is the start address, and end address of the Data Block to be sent.

Start Address Field

Bit	Name	Value	Description
7 ~ 0	Start Address	0 ~ 30	Start address of the Payload Filter Block or Data Block

End Address Field

Bit	Name	Value	Description
7 ~ 0	End Address	0 ~ 30	End address of the Payload Filter Block or Data Block End address >= Start Address and End address - Start Address < 20

Filter value Field

Byte	Name	Value	Description
0 ~ 20	Value	string	Rule Type = "0x01: Payload Filter Block": The data for the filter. Rule Type = "0x02: Data Block": The gateway does not report the value because this command lets the server check which blocks to send, and there is no actual data to send.

Table 6: Payload Filter and Report Example

Byte Offset		Default Value	Description	Properties	Remark
0	0	0x02	Data length – 2 bytes	Constant Preamble	Payload Filter Block 1
1	1	0x01	Data type – flags	Constant Preamble	
2	2	0x06	LE and BR/EDR flag	Constant preamble	Data Block 1
3	3	0x1A	Data length – 26 bytes	Constant preamble	
4	4	0xFF	Data type - Manufacturer specific data	constant preamble	Payload Filter Block 2
5	5	0x4C	Manufacturer data	Constant preamble	Data Block 2
6	6	0x00	Manufacturer data	Constant preamble	
7	7	0x02	Manufacturer data	Constant preamble	
8	8	0x15	Manufacturer data	Constant preamble	
9	9	0xF2	Proximity UUID 1st byte	User UUID	Payload Filter Block 3
10	A	0xA5	Proximity UUID 2nd byte	User UUID	
11	B	0x2D	Proximity UUID 3rd byte	User UUID	
12	C	0x43	Proximity UUID 4th byte	User UUID	
13	D	0xE0	Proximity UUID 5th byte	User UUID	

14	E	0xAB	Proximity UUID 6th byte	User UUID	
15	F	0x48	Proximity UUID 7th byte	User UUID	
16	10	0x9C	Proximity UUID 8th byte	User UUID	
17	11	0xB6	Proximity UUID 9th byte	User UUID	
18	12	0x4C	Proximity UUID 10th byte	User UUID	
19	13	0x4A	Proximity UUID 11th byte	User UUID	
20	14	0x83	Proximity UUID 12th byte	User UUID	
21	15	0x00	Proximity UUID 13th byte	User UUID	
22	16	0x14	Proximity UUID 14th byte	User UUID	
23	17	0x67	Proximity UUID 15th byte	User UUID	
24	18	0x20	Proximity UUID 16th byte	User UUID	
25	19	AA	Major 1st byte	Major value	Data Block 3
26	1A	BB	Major 2nd byte	Major value	
27	1B	CC	Minor 1st byte	Minor value	
28	1C	CC	Minor 2nd byte	Minor value	
29	1D	0xB3	Signal power (Calibrated SSI@1m)	Signal power value	Data Block 4
30	1E	xx*			

When a beacon's payload matches the data in "Payload Filter Block" 1~3 (yellow), the Bluetooth gateway reports "Data Block" 1~4 (green) to the LoRaWAN gateway.

Below is an example according to the beacon payload in **Table 6: Payload Filter and Report Example**. There is only one type of data saved and the type ID is 3.

0x30-01-37-01-0001-0201-01-0404-FF-01-0918-F2A52D43E0AB489CB64C4A8300146720-02-0203-02-0508-02-191A-02-1D1D

0x30, message type field. The message type is 3.

01, Beacon Type Quantity Field. The gateway receives one type of beacon.

37, payload block field. 3 is the beacon type ID. There are 7 filters and data blocks.

01, rule type, Payload Filter Block #1.

0001, the start address of the first Payload Filter Block is 0x00, end address is 0x01.

0201, filter data is 0201.

01, rule type, Payload Filter Block #2.

0404, the start address of the second Payload Filter Block is 0x04, end address is 0x04.

FF, filter data.

01, rule type, Payload Filter Block #3.

0918, the start address of the second Payload Filter Block is 0x09, end address is 0x18.

F2A52D43E0AB489CB64C4A8300146720, filter data.

02, rule type, Data Block #1.

0203, the start address of the first Data Block is 0x02, end address is 0x03. 0x061A will be sent if the same beacon is received by the gateway.

02, rule type, Data Block #2.

0508, the start address of the first Data Block is 0x05, end address is 0x08. 0x4C000215 will be sent if the same beacon is received by the gateway.

02, rule type, Data Block #3.

191A, the start address of the first Data Block is 0x19, end address is 0x1A. 0xAABB will be sent if the same beacon is received by the gateway.

02, rule type, Data Block #4.

1D1D, the start address of the first Data Block is 0x1D, end address is 0x1D. 0xB3 will be sent if the same beacon is received by the gateway.

3.4.4 Type 1 Beacon Uplink Message

The gateway reports the message according to the message body below if only the type 1 beacon is received.

Bytes	**1**	**1~31**	**1**	**1~31**	**1**	**……**
Item	Type	Data	RSSI	Data	RSSI	……

Type Field

Bit	**Name**	**Value**	**Description**
7 ~ 4	Message Type	0x8	Message type
3 ~ 0	Number	1~15	The number of beacons to be reported.

Data Field

Byte	**Name**	**Value**	**Description**
1 ~ 31	Data	string	Data Block to be reported

RSSI Field

Bit	**Name**	**Value**	**Description**
7~0	RSSI	byte	Received Signal Strength Indication of the beacon, the server utilizes it to calculate the distance. (unit: -1dBm)

Below is an example of the uplink message if there is only one type of beacon as shown in **Table 6: Payload Filter and Report Example**.

Yellow, beacon type ID

Green, data

Blue, RSSI

0x81-061A4C000215AABB-B3

81, 8 is the Type 1 Beacon and 1 represents there is one beacon.

0x84-061A4C000215AABB-B3-061A4C000215AABC-B4-061A4C000215AABD-B5-061A4C000215AABE-B6

There are 4 Type 1 beacons.

3.4.5 Type 2 Beacon Uplink Message

The gateway reports the message according to the message body below if only the type 2 beacon is received.

Bytes	**1**	**1~31**	**1**	**1~31**	**1**	**……**
Item	Type	Data	RSSI	Data	RSSI	……

Type Field

Bit	Name	Value	Description
7 ~ 4	Message Type	0x9	Message type
3 ~ 0	Number	1~15	The number of beacons to be reported.

Data Field

Byte	Name	Value	Description
1 ~ 31	Data	string	Data Block to be reported

RSSI Field

Bit	Name	Value	Description
7~0	RSSI	byte	Received Signal Strength Indication of the beacon, the server utilizes it to calculate the distance. (unit: -1dBm)

3.4.6 Type 3 Beacon Uplink Message

The gateway reports the message according to the message body below if only the type 3 beacon is received.

Bytes	**1**	**1~31**	**1**	**1~31**	**1**	**……**
Item	Type	Data	RSSI	Data	RSSI	……

Type Field

Bit	Name	Value	Description
7 ~ 4	Message Type	0xA	Message type
3 ~ 0	Number	1~15	The number of beacons to be reported.

Data Field

Byte	Name	Value	Description
1 ~ 31	Data	string	Data Block to be reported

RSSI Field

Bit	Name	Value	Description
7~0	RSSI	byte	Received Signal Strength Indication of the beacon, the server utilizes it to calculate the distance. (unit: -1dBm)

3.4.7 Multi Types of Beacons

The gateway reports the message according to the message body below if more than one type of beacon is received. The beacons are sent according to the FIFO rule.

Bytes	**1**	**1**	**1~31**	**1**	**1**	**1~31**	**1**	**……**
Item	Type	Beacon Type ID	Data	RSSI	Beacon Type ID	Data	RSSI	……

Type Field

Bit	Name	Value	Description
7 ~ 4	Type	0xE	Message type
3 ~ 0	Number	1~15	The number of the beacon.

Beacon Type Field

Bit	Name	Value	Description
7~ 0	Beacon Type ID	1-3	The ID of the beacon filter is used to distinguish the filters used by different beacons. Maximum 3 types of beacons are supported.

Data Field

Byte	Name	Value	Description
1 ~ 31	Data	String	Data Block to be reported

RSSI Field

Bit	Name	Value	Description
7~0	RSSI	Byte	Received Signal Strength Indication of the beacon, the server utilizes it to calculate the distance. (unit: -1dBm)

Below is an example of 3 kinds of beacons.

Yellow, beacon type ID

Green, data

Blue, RSSI

0xE3-01-061A4C000215AABB-B3-03-061A4C000215AACC-B1-02-061A4C000215AADD-B5

3.4.8 Acknowledgment

Bytes	**1**	**1**
Item	Type	MSGID

Type Field

Bit	Name	Value	Description
7~4	Type	0xF	Message type, AS uses it to identify different uplink messages.
3~0	Result	0: Success 1: Failure	Processes result in any downlink message that needs to be acknowledged.

MSGID Field

Bit	Name	Value	Description
7~0	MSGID	0~255	MSGID field of the corresponding downlink message.

3.5 Downlink Message

Table 7: Downlink Message Table

Message Type	Name	Description
0x1	Registration Acceptance	Registration result message
0x8	LoRa configuration	AS uses this message to configure LoRa parameters.
0x9	Gateway configuration	AS uses this message to configure the gateway parameters.
0xA	Command request	AS uses this message to request the gateway to execute

		instructions.
0xF	Acknowledgment	Processes result in any uplink message that needs to be acknowledged.

3.5.1 Registration Acceptance

Bytes	**1**
Item	Type

Type Field

Bit	**Name**	**Value**	**Description**
7~4	Type	0x1	Message type, the gateway uses it to identify different downlink messages.
3~0	Result	0: Success 1: Illegal gateway 2: Server busy	Register result. In the current gateway, if the result is not 0, the BLE gateway will send the registration message again.

3.5.2 LoRa Configuration

Bytes	**1**	**1**	**1**
Item	Type	DR	MODE

Type Field

Bit	**Name**	**Value**	**Description**
7~4	Type	0x8	Message type, the gateway uses it to identify different downlink messages.
3	ADR	0: OFF 1: ON	ADR (Adaptive Data Rate) status.
2~0	Reserved	0x0	Reserved for future use

DR Field

Bit	**Name**	**Value**	**Description**
7~4	DR	3~5	Data Rate (DR3~DR5). The data rate is limited from DR3 to DR5.
3~0	Reserved	0	Reserved for future use

Mode Field

Bit	**Name**	**Value**	**Description**
7~5	Mode	0	LoRaWAN sub-band. These bits are reserved and can’t be changed.
4~0	Power	0~20	LoRa transmit power (unit: dBm)

3.5.3 Gateway Configuration

Bytes	**1**	**2**	**1**
Item	Type	POS	HB

Type Field

Bit	Name	Value	Description
7~4	Type	0x9	Message type; the gateway uses it to identify different downlink messages.
3~0	Reserved	0x0	Reserved for future use.

POS Field

Bit	Name	Value	Description
15~0	POS	0~65535	Report interval, unit 5s. 0 means OFF. (Big endian) Default: 2 (10s)

HB Field

Bit	Name	Value	Description
7~0	HB	1~255	Heartbeat message period, unit 30s. This value must be larger than 0. Default: 10 (5 minutes)

3.5.4 Command Request

Bytes	**1**	**1**	**1**
Item	Type	MSGID	Value

Type Field

Bit	Name	Value	Description
7~4	Type	0xA	Message type; the gateway uses it to identify different downlink messages.
3~0	COMMAND	0x2:Register request 0x3: Device reboot 0x4: Stop Bluetooth receiving 0x5: Start Bluetooth receiving 0x6: Change Bluetooth receiving start time 0x7: Change Bluetooth receiving duration 0x8: Beacon Report Rule 0x9: Set Beacon Rule	Requested command. **0x2**: Request the gateway to send the register message. **0x3**: Reboot the gateway. **0x4**: Stop continuously receiving Bluetooth. It is opposed to 0x5. Once 0x4 is activated, it enables receiving function for 3 seconds (or the value set before 0x5) ahead of sending. Please refer to **Figure 1: POS Field and Receiving Period**. **0x5**: Start continuous Bluetooth receiving. It applies to all Bluetooth gateways. **0x6**: Advance or delay the receiving start time. It applies to all BLE gateways. The negative value advances the start time. **Figure 2: Delay the Receiving Start Time** shows an example of delaying the receiving start time for 3 seconds. It applies to all BLE gateways. Command: 0xA60103 Advance 3s command: 0xA601FD 0xFD = Decibel 256-3 **0x7**: Change the receiving duration for the solar and

			macro BLE gateway. By default, the Bluetooth receiving is 3 seconds long. **Figure 3: Bluetooth Receiving Period: 5s** is an example of changing it to 5 seconds. Command: 0xA70205 Default: Compact and Indoor BLE Gateway, Bluetooth is in continuous receiving mode. POS field is 10s (the report interval is 10s). Solar and Macro gateway, Bluetooth receiving is 3s. POS field is the 20s (the report interval is 20s). **0x8:** The gateway reports each type of beacon's rule (filter block and data block) in one message as described in **3.4.3 Rule Report**. It sends 3 times if 3 types of beacons were set with an interval of 5s. Do not set the value to this field. Command: 0xA802 02 is the message ID, it can be any other number. *Note:* **0x9:** Set the beacon Rule Type: a. Payload Filter Block: Start and end address, and the data to be filtered. b. Data Block: Start and end address

Note 1, the gateway sends the following default settings when 0xA802 is received. The interval is 5s.

0x30-03-12-01-0918-F2A52D43E0AB489CB64C4A8300146720-02-191C

0x30-03-22-01-0918-F2A52D43E0AB489CB64C4A8300146721-02-191C

0x30-03-32-01-0918-F2A52D43E0AB489CB64C4A8300146722-02-191C

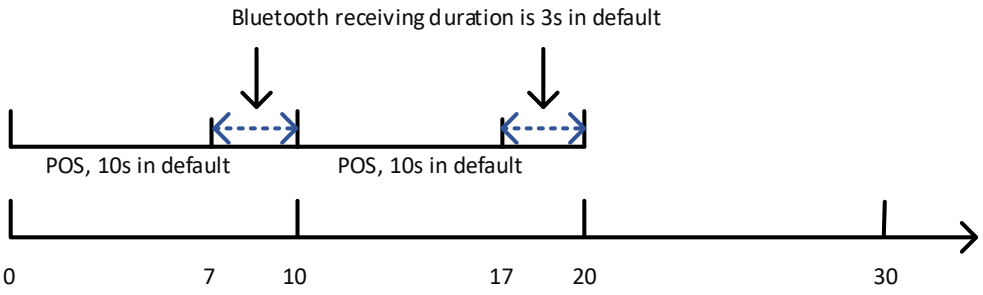


Figure 1: POS Field and Receiving Period

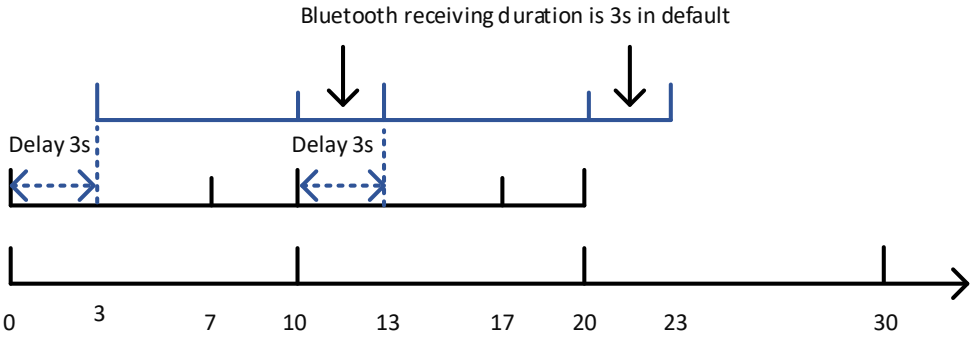


Figure 2: Delay the Receiving Start Time

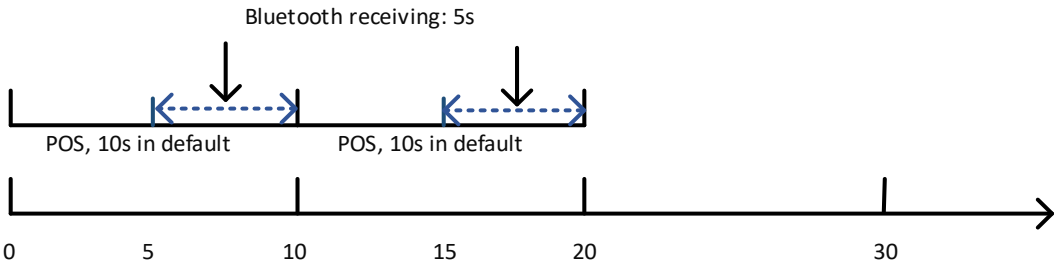


Figure 3: Bluetooth Receiving Period: 5s

MSGID Field

Bit	Name	Value	Description
7~0	MSGID	0~255	This field is for the server to differentiate the ACK message sent by the gateway. The server generates a sequence number of downlink messages that need MSGID. The gateway responds ACK with this number. Otherwise, AS should resend the message.

Value Field

Bit	Name	Value	Description
7~0	Value	-127~127	If the command is 6, this field is used to set the value of advancing or delaying time. If the value is positive, the receiving starting time will delay, or else will advance. If the command is 7, this field sets the value of the new receive time.

Value Field (command = 0x9)

The gateway only supports sending one command to set one type of beacon at a time.

Bytes	**1**	**3~23**				**3~23**
Item	Payload Block Type	1	1	1	0~23	……
		Rule Type	Start Address	End Address	Filter Value	……

Payload Block Type Field

Bit	Name	Value	Description
7 ~ 4	The ID of different Beacon Types	1 ~ 3	The ID of the beacon filter is used to distinguish the filters used by different beacons. Maximum 3 types of beacons are supported.
3 ~ 0	Rule number	0~ 13	The total number of filters and data. Delete the corresponding rule of this type of beacon when 0. The later command replaces the existing one when the same beacon type ID is used.

Rule Type Field

Bit	Name	Value	Description
7 ~ 0	Rule Type	0x01: Payload Filter Block 0x02: Data Block	0x01: Filter the beacon advertisement data; 0x02: Select the data advertised by the beacon;

Start Address Field

Bit	Name	Value	Description
7 ~ 0	Start Address	0 ~ 30	Start address for filtering block or data block;

End Address Field

Bit	Name	Value	Description
7 ~ 0	End address	0 ~ 30	End address for filter block or data block; End address >= Start Address and End address - Start Address < 20

Filter Value Field

Byte	Name	Value	Description
0 ~ 20	Value	String	Rule Type = Payload Filter Block: The data for the filter. Rule Type = Data Block, the data to be reported

Example: A downlink command with 7 sub-rules to set up the type 2 beacon.
0xA9-00-27-01-0001-0201-01-0404-FF-01-0918-F2A52D43E0AB489CB64C4A8300146720-02-0203-02-0508-02-191A-02-1D1D

Example: A downlink command with 7 sub-rules to set up the type 3 beacon.
0xA9-00-37-01-0001-0201-01-0404-FF-01-0918-F2A52D43E0AB489CB64C4A8300146720-02-0203-02-0508-02-191A-02-1D1D

Example: If you want to delete the beacon, for example, the type 3 beacon, you can send the downlink command.
0xA9-00-30

Example: Incorporate Eddystone beacons.

Eddystone supports 4 types of payload structure: Eddystone-UID, Eddystone-URL, Eddystone-TLM, Eddystone-EID. Refer to the link below for detailed information.

https://github.com/google/eddystone/blob/master/protocol-specification.md

The Eddystone payload length is 31 bytes, 0~6 is constant in a beacon, and can be used as a filter block. 7~30 bytes is the data block to be sent.

0xA9-00-32-01-0006-0201060303AAFE-02-071E

3.5.5 Acknowledgment

Bytes	**1**	**1**
Item	Type	MSGID

Type Field

Bit	**Name**	**Value**	**Description**
7~4	Type	0xF	Message type, the gateway uses it to identify different downlink messages.
3~0	Reserved	0x0	Reserved for future use.

MSGID Field

Bit	**Name**	**Value**	**Description**
7~0	MSGID	0~255	The message ID of the corresponding uplink message, e.g., alarm report

4. Ordering Information

Table 8: Indoor BLE Gateway Part Number

Description	Part Number
BLE Gateway, BLE5.0, 120x120x31mm, CN470, 5V	100-18369
BLE Gateway, BLE5.0, 120x120x31mm, CN470-Ali, 5V	100-18370
BLE Gateway, BLE5.0, 120x120x31mm, IN865, 5V	100-18365
BLE Gateway, BLE5.0, 120x120x31mm, AU915, 5V	100-18465
BLE Gateway, BLE5.0, 120x120x31mm, AS923, 5V	100-18466
BLE Gateway, BLE5.0, 120x120x31mm, US915, 5V	100-18467
BLE Gateway, BLE5.0, 120x120x31mm, EU868, 5V	100-18468
BLE Gateway, BLE5.0, 120x120x31mm, IN865, 5V	100-18469
BLE Gateway, BLE5.0, 120x120x31mm, KR920, 5V	100-18378

Table 9: Compact BLE Gateway Part Number

Description	Part Number
BLE Gateway, BLE 5.0, 97x62x7mm, CN470, 5V	100-18471
BLE Gateway, BLE 5.0, 97x62x7mm, CN470-Ali, 5V	100-18472
BLE Gateway, BLE 5.0, 97x62x7mm, AS923, 5V	100-18475
BLE Gateway, BLE 5.0, 97x62x7mm, US915, 5V	100-18473
BLE Gateway, BLE 5.0, 97x62x7mm, RU864, 5V	100-18476
BLE Gateway, BLE 5.0, 97x62x7mm, EU868, 5V	100-18477
BLE Gateway, BLE 5.0, 97x62x7mm, AU915, 5V	100-18478
BLE Gateway, BLE 5.0, 97x62x7mm, IN865, 5V	100-18479
BLE Gateway, BLE 5.0, 97x62x6mm, KR920, 5V	100-18474

Table 10: Solar BLE Gateway Part Number

Description	Part Number
BLE Gateway, built-in antenna, BLE 5.0, solar, 150x90x60mm, EU868, 5300mAh	100-02046
BLE Gateway, built-in antenna, BLE 5.0, solar, 150x90x60mm, AS923, 5300mAh	100-02048
BLE Gateway, built-in antenna, BLE 5.0, solar, 150x90x60mm, US915, 5300mAh	100-02049
BLE Gateway, external antenna, BLE 5.0, solar, 150x90x60mm, US915, 5300mAh	100-02231
BLE Gateway, built-in antenna, BLE 5.0, solar, 150x90x60mm, AU915, 5300mAh	100-02050
BLE Gateway, built-in antenna, BLE 5.0, solar, 150x90x60mm, RU864, 5300mAh	100-02051
BLE Gateway, built-in antenna, BLE 5.0, solar, 150x90x60mm, KR920, 5300mAh	100-02052
BLE Gateway, built-in antenna, BLE 5.0, solar, 150x90x60mm, IN865, 5300mAh	100-02053

Table 11: Macro BLE Gateway Part Number

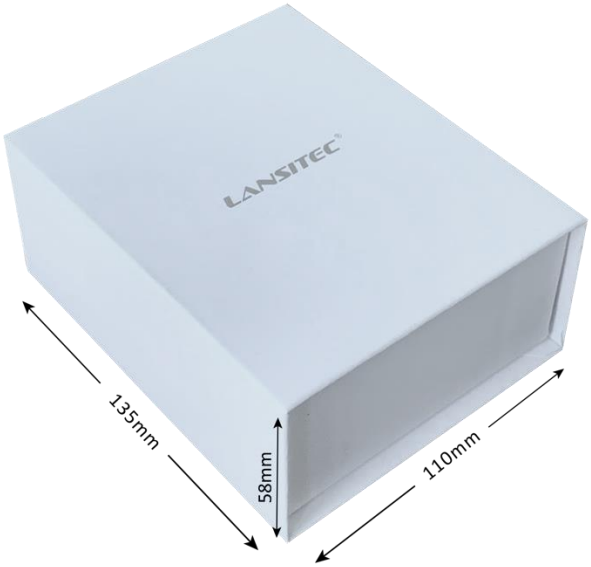
Description	Part Number
BLE Gateway, built-in antenna, BLE 5.0, 150x90x60mm, EU868, 38000mAh	100-02392
BLE Gateway, built-in antenna, BLE 5.0, 150x90x60mm, AS923, 38000mAh	100-02365
BLE Gateway, built-in antenna, BLE 5.0, 150x90x60mm, US915, 38000mAh	100-02366
BLE Gateway, built-in antenna, BLE 5.0, 150x90x60mm, AU915, 38000mAh	100-02367

BLE Gateway, built-in antenna, BLE 5.0, 150x90x60mm, RU864, 38000mAh	100-02368
BLE Gateway, built-in antenna, BLE 5.0, 150x90x60mm, KR920, 38000mAh	100-02369
BLE Gateway, built-in antenna, BLE 5.0, 150x90x60mm, IN865, 38000mAh	100-02370

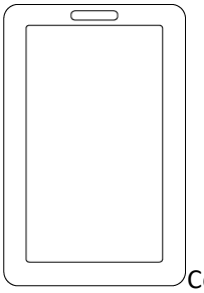
5. Packaging

Below is the packaging for Compact BLE Gateway, BLE 5.0, 97x62x7 mm:

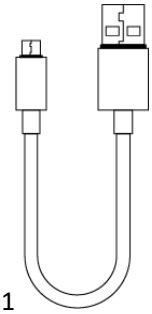
When shipped as samples:



Packing list:



Compact BLE Gateway x 1

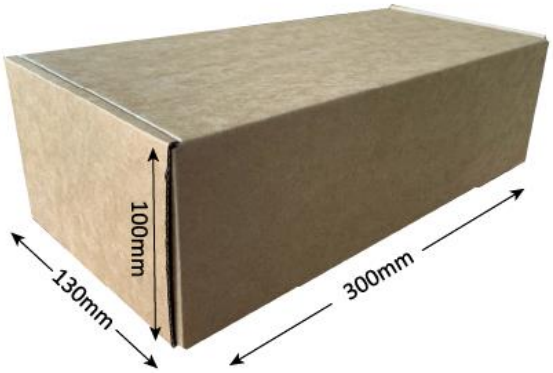


Micro USB Charging Cable (1.0m) x 1

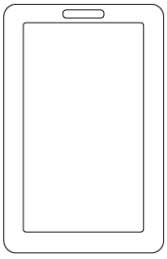
Lanyard x 1

PVC Sticker x 1

When shipped in batches:

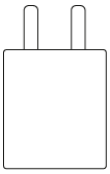


Packing list:

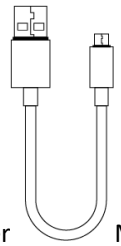


Compact BLE Gateway x 10

Accessories for each gateway (shipped in another package):



USB Charger



Micro USB Charging Cable

Lanyard

Sticker