



Qianwu Qianxun Gateway WE- RWF01/WE-RBF01

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I. Overview

The Qianwu Qianxun Gateway is a compact, aesthetically designed, and multifunctional card reader base station independently designed and developed by Shidian Technology. It can perform traditional warehouse operations—such as item registration and detailed query—while also supporting intelligent warehouse management tasks—including rapid personnel and item location tracking, proximity/exit alarms, and fuzzy location search using tag-based mapping—thereby significantly enhancing the efficiency of warehouse management and personnel attendance tracking. When paired with any audible and visual tag system, the gateway enables users to utilize a mobile app to simultaneously read electronic tags within a 60-meter radius for rapid inventory counting, precise item retrieval, and personnel attendance tracking.

The computer-based management backend handles daily administrative tasks, such as batch adding of base stations and tags, quickly associating material information, and grouping materials categorized by date or supplier. Users can also import a physical map via the desktop interface; after placing the corresponding base station on the map, they can instantly determine the signal coverage area of the tag on the map, significantly enhancing personnel management efficiency.

Using computer-based management software or the Qianwu Qianxun mobile app enables simultaneous reading of up to 1,000 tags and simultaneous triggering of audio-visual alerts for up to 80 tags. The mobile app allows users to quickly locate items or individuals via audio-visual alerts, enhancing search efficiency through customizable lighting and calling modes. The "Near-Base Station Alert" and "Departure Alert" features enable timely detection of lost items in the warehouse or individuals who have become separated at the site, thereby strengthening risk prevention measures in warehouse management and simplifying personnel management. Additionally, the mobile app allows for remote management of assets by viewing a map based on the signal coverage area detected by Qianwu Qianxun.

The Qianwu Qianxun Gateway can transmit data via Bluetooth, 4G, or Wi-Fi, and integrates with the Qianwu Qianxun Smart App for information exchange. It supports various functions including device addition and removal, tag binding, real-time location tracking, audible/visual search, and real-time inventory management.

The Qianwu Qianxun Gateway offers users software customization services, enabling long-distance card reading and calling (location) functions via 4G, Wi-Fi, or Bluetooth data transmission. Users can develop custom software to connect to this card reader, allowing them to read or call electronic tags within a range of up to 60 meters. When used in conjunction with smartphones or tablets, this solution facilitates seamless mobile item tracking and real-time inventory management, significantly enhancing the efficiency of warehouse, production, and logistics operations.

II. Key Features

- ◆ Operates in various modes—including card reading, call initiation, and data transmission—with a communication range of no less than 50 meters.
- ◆ Can read up to 1,000 tags simultaneously and activate up to 80 audio-visual tags at the same time.
- ◆ The USB interface supports Windows, Linux, Android, and macOS operating systems.
- ◆ Operates within an industrial-grade temperature range of -40°C to +85°C
- ◆ Supports Wi-Fi network configuration via the 2.4 GHz frequency band for web-based devices
- ◆ The app supports both iOS and Android systems.

III. Interface Specifications

CMF-1

88.19x88.19x113.13mm

上壳

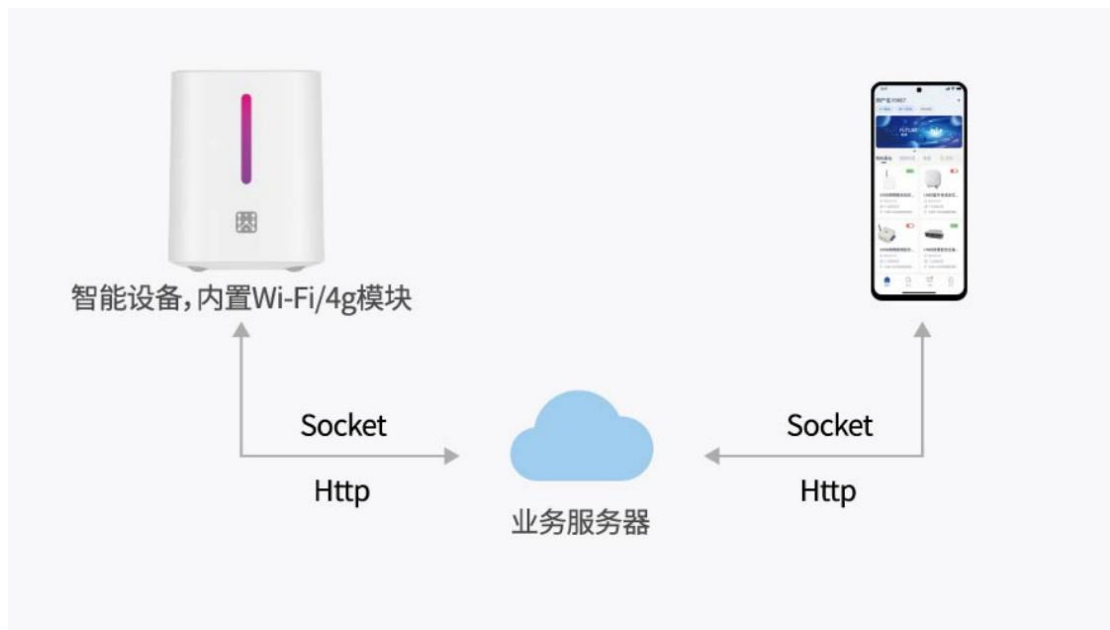
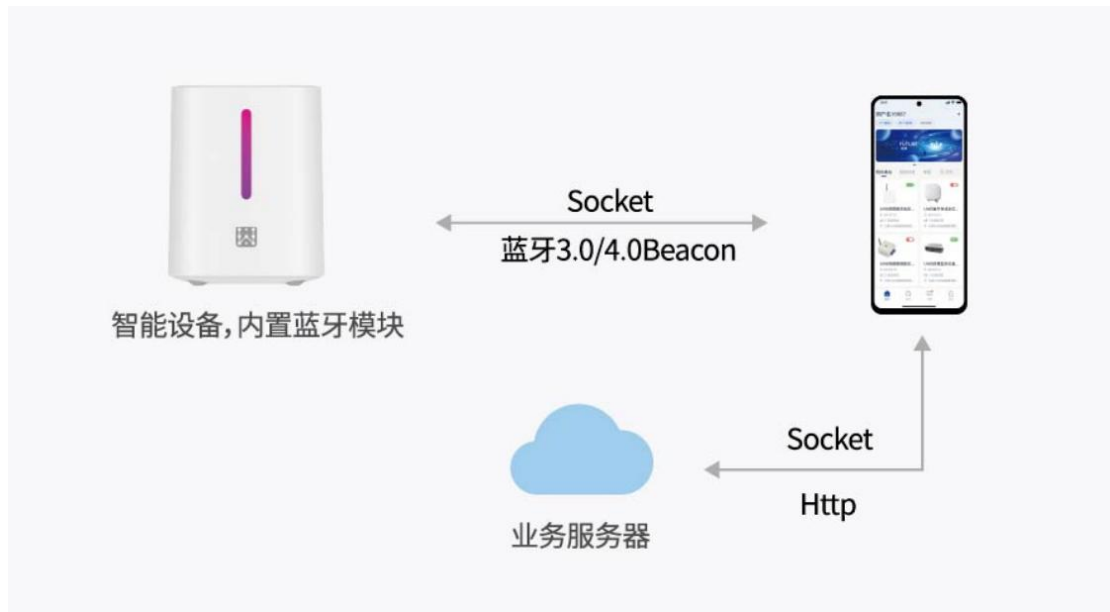
C:PANTONE White
M:ABS
F:亚光

LOGO PANTONE Cool Gray 6U
喷涂亚光小米白效果

注: 材质白色半透明, 喷漆局部浮雕透光



IV. Application Topology Diagram



V. Technical Specifications

project	specifications	parameter
Card reader antenna	carrier frequency	2.4GHz
	modulation mode	QPSK (Quadrature Phase Shift Keying)
	control protocol	IEEE 802.15.4
	receiving sensitivity	-118dBm
	antenna gain	3dBm
Wifi	Spectrum range	2400 ~ 2483.5MHz
	safety	WEP/WPA-PSK/WPA2-PSK
Type-C port	Chip	Use the Qinheng Microelectronics CH340 USB-to-Serial Port Conversion Chip
	Baud rate	115200bps
	data format	8 data bits, 1 stop bit, no parity check
	interface type	Type-C
pilot lamp	RGBtape lights	The app supports 10 different modes.
	charge lamp	Full indicates green; empty indicates red.
source	voltage	5V
	Current	Recommended drive current: 1A or higher
	cell	4000mAh
External Structure	size	88.19mm×88.19mm×113.13mm
	hull	ABS engineering plastic, ceramic white
	weight	260 g
work environment	temperature	-40℃~ 85℃,
	humidity	Less than 95% (no condensation)

VI. Secondary Development Agreement

The APP (Application) accesses the handheld device's serial communication port "/dev/ttyWK2", enabling the retrieval of data from remote tags from the handheld device.

The message format for APP access to handheld devices is as follows:

地址	0	1	2	3	4	5	6	7	...	N	N+1	N+2
字段	前导字节		命令	长度	消息内容						CRC校验	
示例	55	AA	02	06	00	19	F0	A0	...	01	32	54

[Leading Byte]: A fixed value of two bytes (0X55 or 0XAA) serves as an identification marker for detecting a new data packet.

[Command]: 1 byte that specifies the exact meaning of the message; see below:

Command	name	direction	explain
1	Read label	APP (Mobile)	The handheld device reads the tag ID and
2	Call Label	APP (Mobile)	Call the specified tag (audio-visual alert)
3	Direct	APP (Mobile)	The APP requests the handheld device and the
4	Direct	APP (Mobile)	Handheld device feedback data transmission

The call function must be used in conjunction with the audio-visual tag; the transparent transmission function must be used in conjunction with the digital transmission tag module.

[Length] 1 byte – the length of the subsequent "Message Content" field.

[Message Content] To be determined by each individual message.

[CRC Checksum] The result of calculating the CRC16 for the message (excluding the preamble bytes). Used to ensure message integrity.

(1) Read Label Message (0X01)

Message Content:

卡号 4字节	属性 1字节	扩展数据 0~7字节	RSSI值 1字节
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[Card Number] 4 bytes: the card identifier.

[Attribute] 1 byte, used to store information such as tag type, under-voltage flag, and extended data length.

位: 7	6	5	4	3	2	1	0
扩展数据长度			运动标志	标签类型		欠压标志	

Bit 0: Under-voltage indicator. 1: Under-voltage; 0: Normal.

Bits 1–3: Label type. 0: Standard label; 1: Audio-visual label; 7: Empty label (Note 1)

Bit 4 – Motion Flag. This bit is only valid for the motion detection tag. 0: Tag is stationary; 1: Tag is in motion.

Bits 5–7: Extended data length. When necessary, the tag can upload additional extended data (e.g., humidity, temperature, etc.); this extended data field follows immediately after the attribute byte and can span between 0 and 7 bytes.

Note 1: An "empty tag" event occurs when the handheld card reader module fails to detect any electronic tag; in such cases, the module sends an "empty tag" notification to the APP every 3 seconds to indicate that the card reading operation is functioning normally. If the APP does not receive any valid tag information or any "empty tag" notification for an extended period, this indicates a malfunction in the handheld card reader module.

[Extended Data]0–7 bytes: The length of the extended data is specified within the attribute byte; it can carry data specific to the tag (e.g., temperature, humidity, etc.). The extended data may consist of up to 7 bytes or be absent.

[RSSI Value]: A 1-byte value representing the signal strength of the tag data received by the positioning antenna; this signal strength value can be used to calculate the distance between the tag and the positioning antenna.

(2) Call Label Message (0X02)

The APP sends a call tag instruction to the handheld card reader module, causing the designated tag to light up and emit a sound, making it easy for users to quickly locate the tag.

Message Content:

地址	0	1	2	3	4
字段	标签ID				参数
示例	00	19	F0	A0	01

[Parameter]: Byte indicates call mode.

The general definition is as follows (the definitions for individual acoustic and optical labels may vary slightly).

Call Mode	explain
0	Only the green light is flashing.
1	Green light flashing + buzzer sound
2	Only the red light is flashing.
3	Red light flashing + buzzer sound
4	Only alternating red and green
5	Alternating red and green flashing +
255	Stop Reminder

Upon receiving a startup command from the controller, the handheld card reader module will continue its alert operation for the specified tag for a period of 5 seconds. If the controller requires continuous tag calling, it should continuously send calling commands (recommended: once per second). If the handheld card reader module does not receive a calling command for 5 consecutive seconds, it will automatically cease its audio-visual alert operation. This

ensures that, in the event of an unexpected communication interruption between the controller and the card reader module, the card reader module will promptly stop its alert operation.

The handheld device supports concurrent reminder operations for up to 80 tags; when it is necessary to make calls to multiple tags simultaneously, multiple commands can be issued, or a single command may contain information for multiple tags.

For example, when simultaneously calling two electronic tags (1805100,1904212), you can issue the following call command:

55 AA 02 0A 00 1B 8B 2C 01 00 1D 0E 54 01 82 3F

55 AA : 前导字节

02 : 命令 (呼叫标签)

0A : 长度 (10字节)

00 1B 8B 2C	: 标签ID (1805100)
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01	: 模式 (发光发声)
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00 1D 0E 54	: 标签ID (1904212)
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01	: 模式 (发光发声)
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82 3F : CRC校验

(3) Transparent Transmission Request Message (0X03)

The APP sends a data transmission switching command to the handheld card reader module; upon successful switching, the handheld device and the tag establish a point-to-point transparent data transmission channel. The data transmitted by the APP is delivered to the remote device via wireless transparent transmission, and the reverse process also occurs.

After establishing a passthrough channel, the length of data transmitted by the APP each time should be kept within 120 bytes; if it is necessary to transmit excessively long data packets, the APP should wait for a short period (greater than 5 milliseconds) after completing the transmission of a partial data segment (less than 120 bytes) via the serial port before continuing the transmission.

Message Content:

地址	0	1	2	3	4	5	6
字段	标签ID				无线 频道	创建 超时	退出 超时
示例	00	01	E2	40	01	05	0A

[Tag ID]: 4 bytes – applicable to tag cards requiring direct transmission.

[Wireless Channel] 1 byte; Channel (0–7); Total of 8 channels. This wireless channel is used for data transmission directly, preventing mutual interference when transmitting data within the same frequency band.

[Creation Timeout] 1 byte – the maximum waiting time before attempting to create a data transmission channel; unit: seconds. If the creation fails, the controller should issue another handover command to attempt establishing the channel. Valid range: 3–60 seconds.

[Exit Timeout] 1 byte: The timeout duration for exiting the data transmission channel (unit: seconds). When data transmission mode is activated, if the channel remains idle (no incoming or outgoing data packets) for the specified timeout period, the system will automatically exit the data transmission mode and revert to Card Reader/Tag Mode. Valid range: 1–60 seconds.

As a typical example, the instruction sequence for establishing a data transmission channel between a card reader and a tag with ID "123456" is as follows:

55 AA 03 07 00 01 E2 40 01 05 0A 0D 5B

Each field is explained as follows:

55 AA	前导字节
03	消息命令 (切换到透传)
07	消息内容长度 (有7个字节的消息内容)
00 01 E2 40	消息内容/ 标签ID (123456)
01	消息内容/ 无线频道 (使用1号频道)
05	消息内容/ 创建超时 (最多等待5秒)
0A	消息内容/ 退出超时 (10秒没有数据退出)
0D 5B	CRC校验

Serial port transparent data packets – each packet has a maximum size of 120 bytes, with a minimum packet interval of 10 ms. Extremely long packets will have their excess data automatically truncated.

(4) Transparent Response Message (0X04)

The handheld device responds to the APP with the result of the transparent switching operation – whether it was successful or failed.

Message Content:

地址	0	1	2	3	4
字段	标签ID				结果
示例	00	19	F0	A0	01

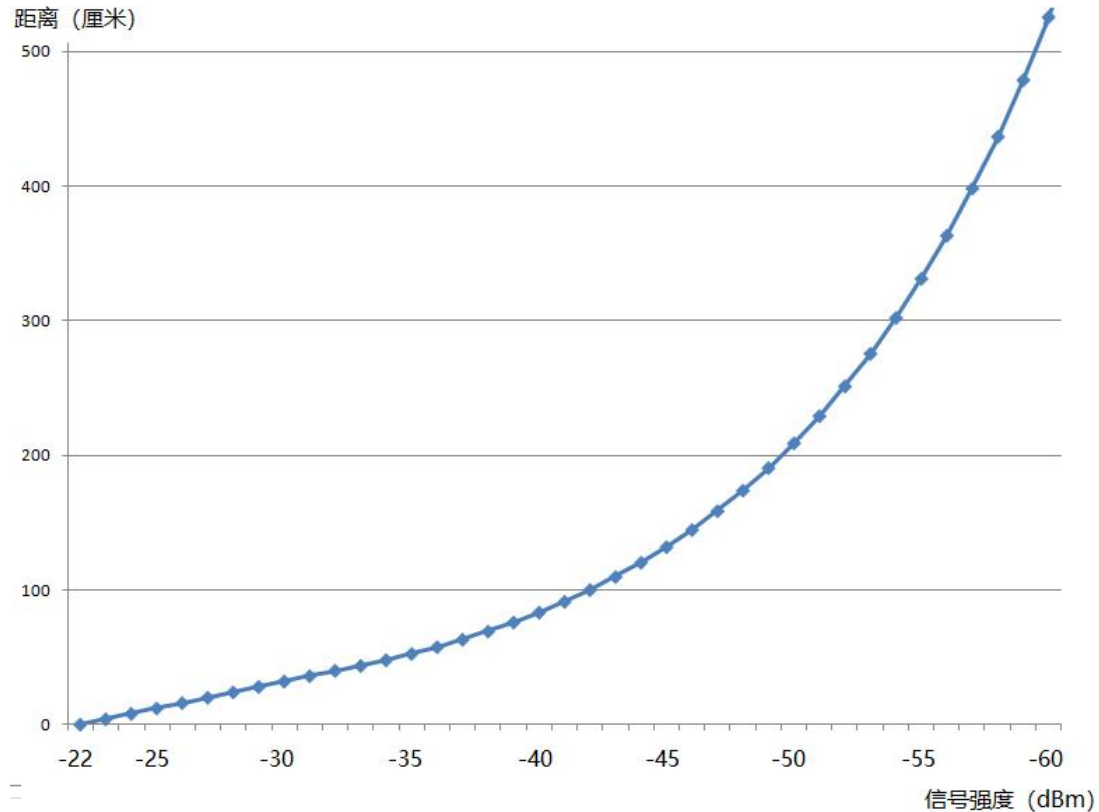
[Result]The return value indicates whether a passthrough channel was successfully created:
0 – Success; 1 – Failure.

Example: 55 AA 04 05 00 1B 8B 2C 00 9B 34

55 AA : 前导字节
04 : 命令 (呼叫标签)
05 : 长度 (5字节)
00 1B 8B 2C : 标签ID (1805100)
00 : 结果 (创建透传通道成功)
9B 34 : CRC校验

VII. Distance Measurement Formula

This product calculates the distance between the electronic tag and the antenna by measuring the wireless signal field strength; the relationship between this distance and the wireless signal strength follows an exponential curve, as shown below:



Due to chart size limitations, only the correspondence for distances within 6 meters is displayed.

In the above figure, there are three values that require repeated measurement and calibration.

- 1、 L0: Signal strength when the distance between the tag and the reader is 0 cm; measured value: -22 dBm.
- 2、 L1: Signal strength when the tag is 40 cm away from the card reader; measured value: -32 dBm.
- 3、 L2: Signal strength when the tag is 100 cm away from the card reader; measured value: -42 dBm.

The derived formula based on these three values is as follows:

- 1、信号强度大于等于L0，距离直接判定为0厘米。
- 2、信号强度大于等于L1，距离可以根据线性运算。
距离 = $\frac{L0 - \text{信号强度}}{L0 - L1} * 40$
- 3、信号强度小于L1，距离可以根据指数曲线运算。
距离 = $10^{\frac{L2 - \text{信号强度}}{25}} * 100$

For the specific algorithm implementation, please refer to the source code of our DEMO software.

VIII. Qianwu Qianxun Management Software

Desktop version – Quick Search

- 1、 Add map via desktop**
- 2、 Add a base station via desktop client**
- 3、 Add tag via desktop client**
- 4、 Batch tag addition for desktop computers**
- 5、 Add group on desktop**
- 6、 Batch group addition for desktop clients**

Mobile app – Quick Function Search

- 1、 Mobile device base station configuration**
- 2、 Mobile Device Base Station Management**
- 3、 Mobile device electronic fence feature**
- 4、 Mobile device tag management**
- 5、 Mobile Map Management**
- 6、 Mobile Device Group Management**

1. Add a map via desktop client

After adding a map and placing a base station in the desktop backend, users can view the location range of tags on the map. Log in to the Qianwu Qianxun backend management system, click [Map Management – Map List] in the list on the left side of the homepage, and then click "Add".



Import a 2D floor plan, enter the actual length and width values, then select the bound user ID; after completing these steps, click "Add" in the bottom-right corner of the page. Each account can add multiple maps.



2. Add a base station via the desktop client

Click on [Base Station Management – Base Station List] in the Home Page menu to add a Qianwu Qianxun base station.

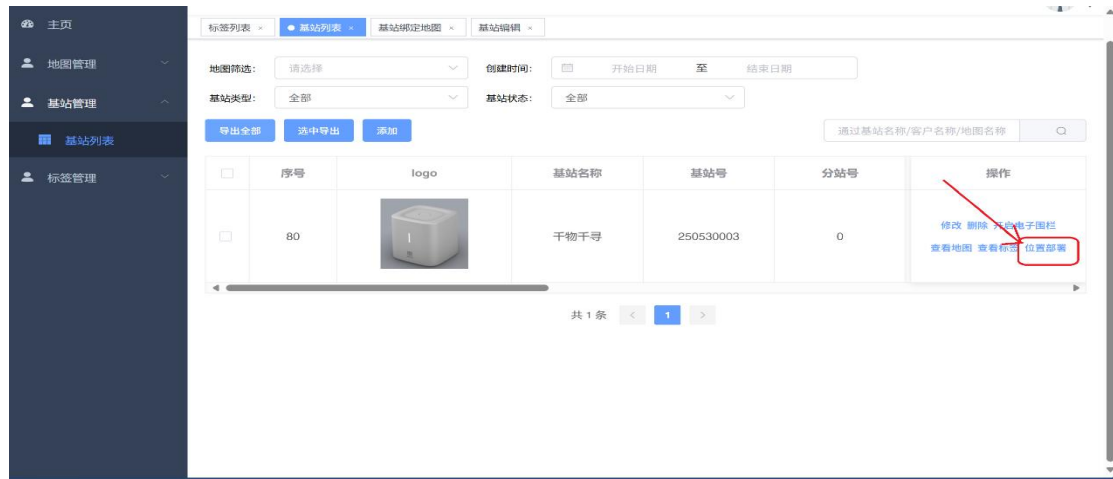


Import the base station's external view image; after filling in the required information



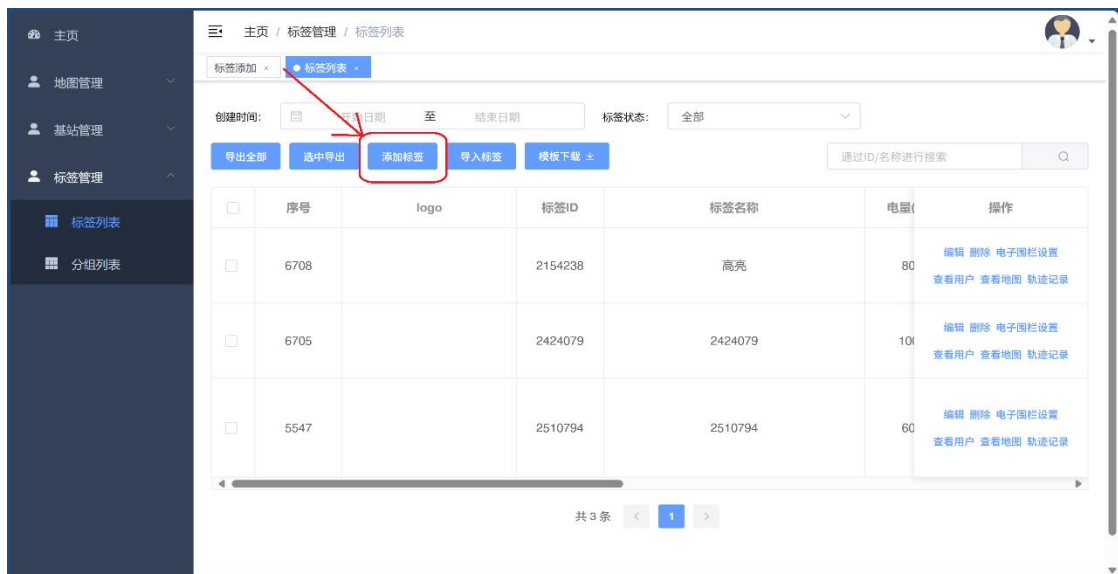
, click "Add".

Click "Location Deployment", select the base station you wish to place, drag the base station to the desired location, and then click "Confirm" in the bottom-right corner. To view the base station's placement location, simply open the map.



3. Add tag via desktop client

Go to [Tag Management – Tag List] in the homepage menu, then click "Add Tag".

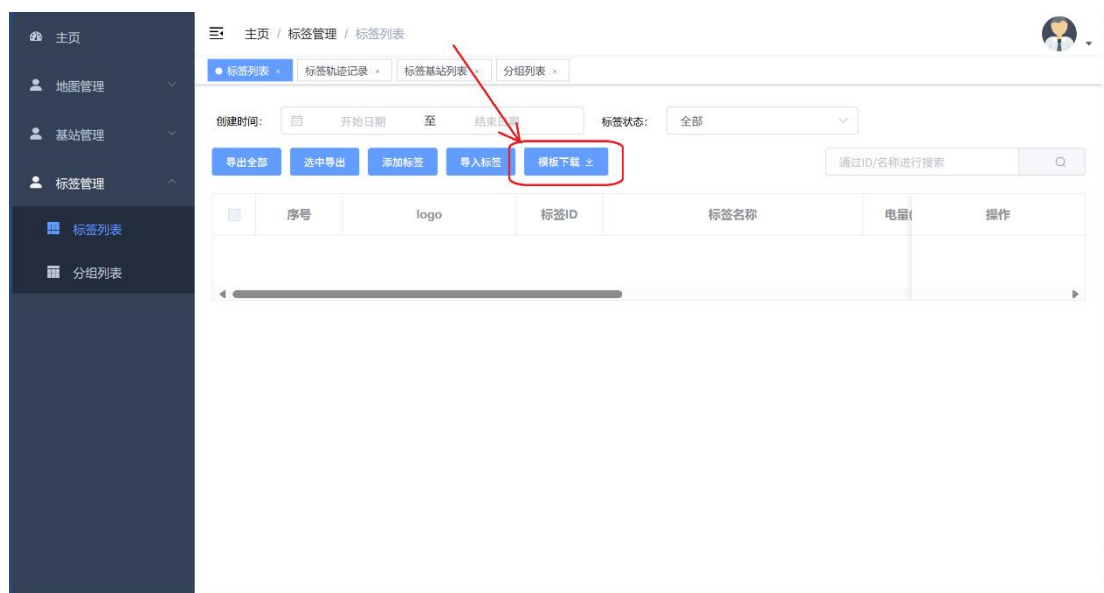


Upload an image for the tag, then enter the tag ID, custom tag name, and tag note. After completing these steps, click "Add". Once the tag has been added, users can search for it by entering its name or ID; the tag note serves as additional information to supplement the tag details.



4. Batch tag addition via desktop client

When there are too many tags, users can use the batch import feature to quickly assign tags. Go to [Tag Management – Tag List] in the homepage menu, then click "Download Template".



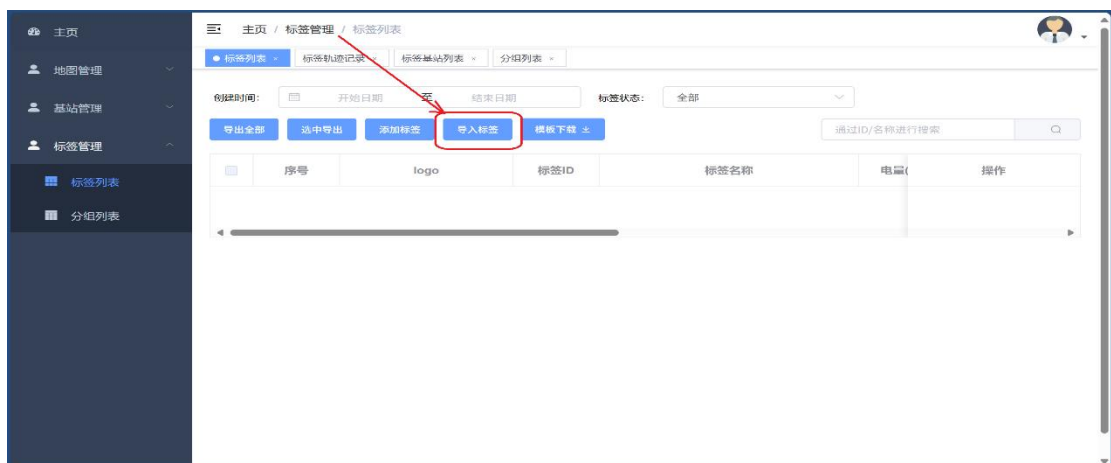
Enter the information required for binding a tag into the downloaded template form—this includes the tag name, tag ID, tag note, user ID, and group ID. The tag name can be customized by the user (and may be the same as another tag's name); the tag ID must be unique; the tag note is optional; the user ID can be a mobile phone number or an email

address; and the group ID is also optional. Once entered, the tag will be automatically added to the corresponding group.

	A	B	C	D	E	F	G	H	I
1	标签名称	标签ID	标签备注	用户手机号/邮箱(可选)填写之后会自动绑定用户	分组ID				
2	定位标签1号	2424079	世电科技	15870807191	13				
3	定位标签2号	2154238	世电科技	15870807191	13				
4									
5	必填	必填	选填	必填	选填				
6									
7									
8									
9									
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11									
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23									

After saving the spreadsheet data, navigate to [Tag Management – Tag List] in the Home page menu and click "Import Tags." Then, select the just saved spreadsheet to complete the batch import.

Note: When importing tags, the base station must be powered off; upon completion of the import process, the base station will automatically bind the tags when powered on.

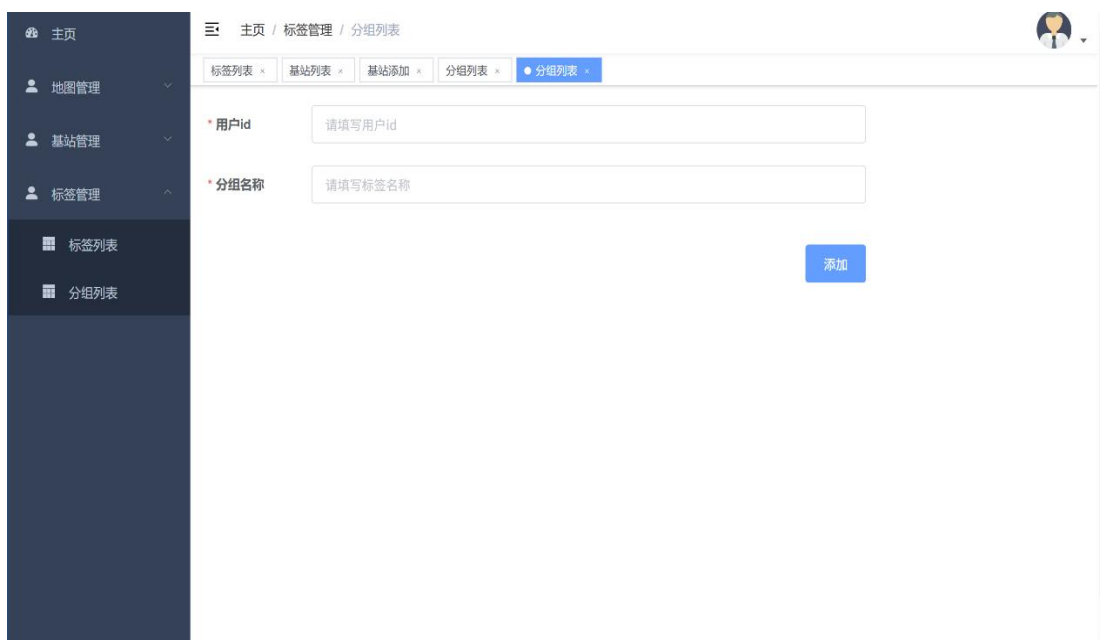


5. Add a group via desktop client

To facilitate batch management of tags, users can group their bound tags. Go to [Tag Management – Group List] in the Home Page list, then click "Add Group".

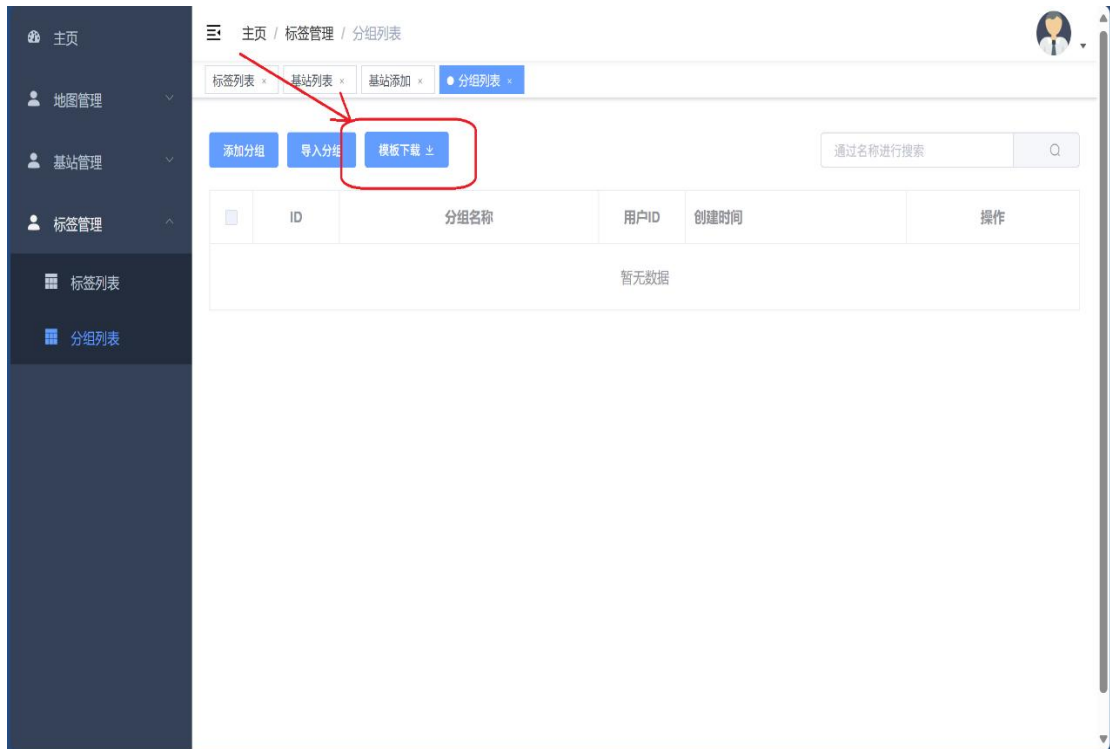


Enter your user ID (mobile number or email address) and group name, then click "Add".

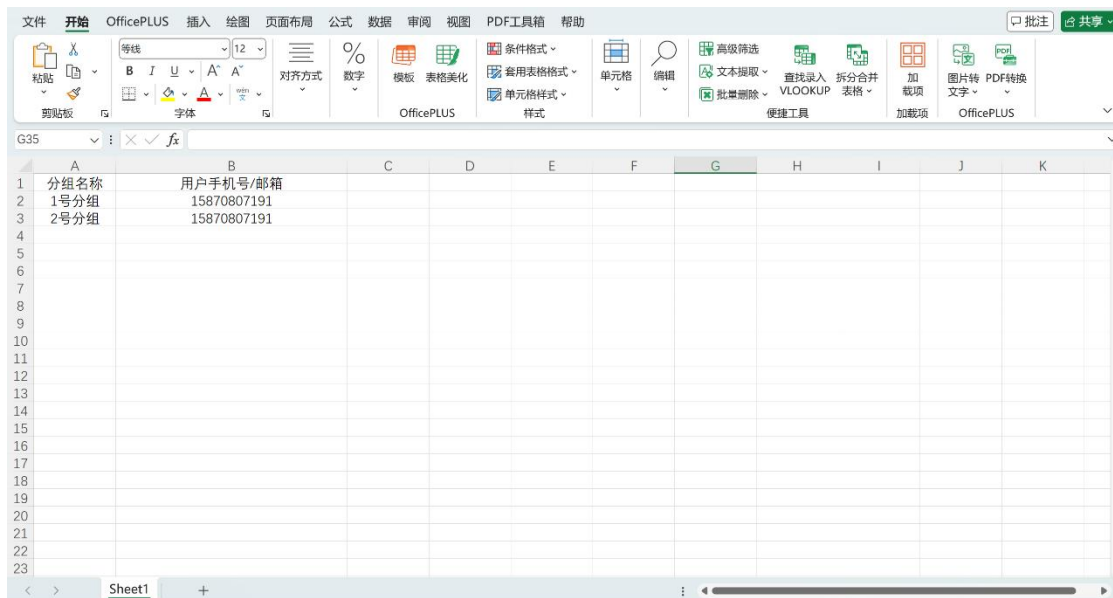


6. Batch group addition via desktop client

Users can add multiple groups at once by performing batch group addition. Go to [Tag Management – Group List] in the homepage menu and click "Download Template".



Enter the group name and user ID (mobile number or email address) in the table.



Save the spreadsheet, then click "Import Grouping" to open the corresponding spreadsheet and complete batch grouping.

主页

地图管理

基站管理

标签管理

标签列表

分组列表

主页 / 标签管理 / 分组列表

标签列表 ×

基站列表 ×

基站添加 ×

● 分组列表 ×

添加分组

导入分组

模板下载

通过名称进行搜索

	ID	分组名称	用户ID	创建时间	操作
暂无数据					

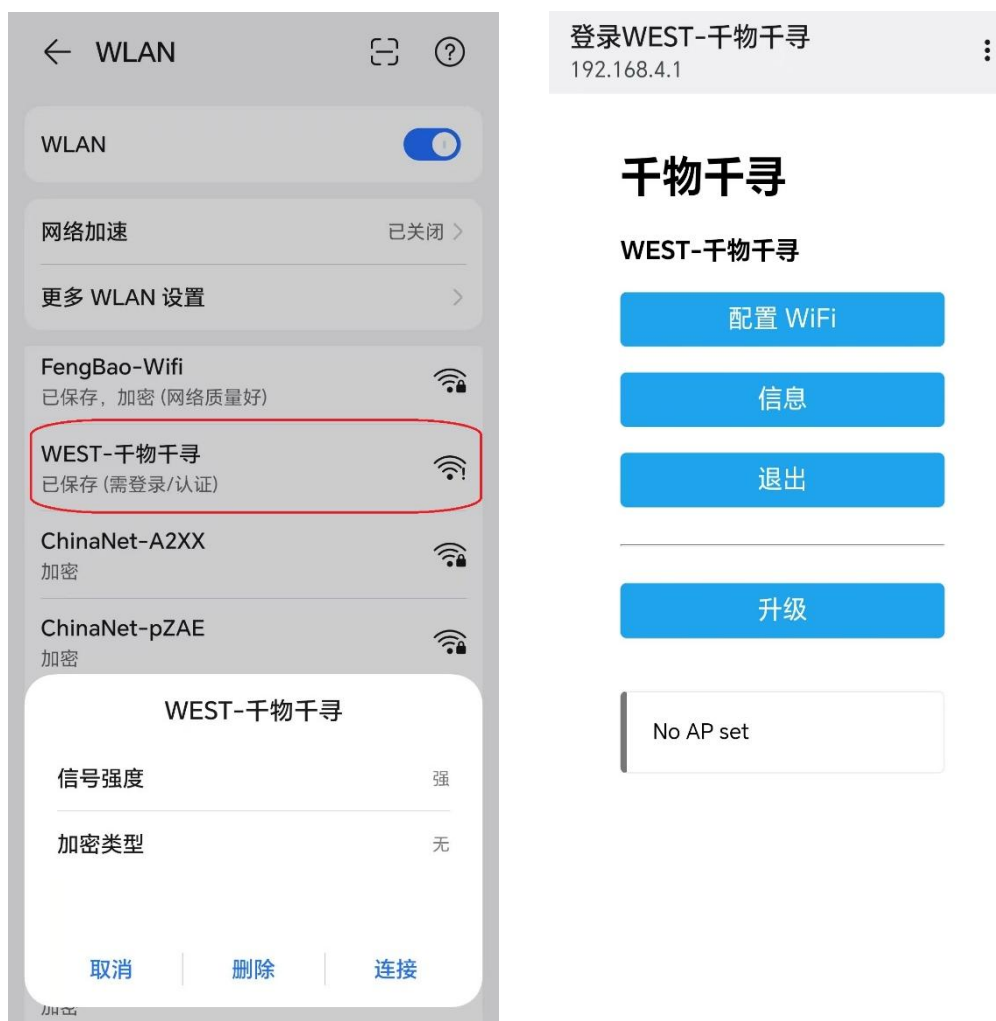
IX. Qianwu Qianxun – Mobile App

Open the Qianwu Qianxun app; after logging in, you can manage the binding and naming of items and base stations, check whether a tag is online or what its battery level is, edit tag notes, register calls for specific tags, view the approximate location range of a tag, and quickly locate items using audible and visual alerts.

1. Mobile device base station configuration

Connect your smartphone to a card reader device via Wi-Fi, then launch the [Qianwu Qianxun] app to read the information of your linked items or to locate/locate and call electronic tags. This allows you to search for items on the go – fast and convenient.

Turn on the power switch of the Qianwu Qianxun Card Reader; ensure that the device's indicator light is illuminated in red. On the user's mobile phone, enable Wi-Fi settings, locate the "WEST-Qianwu Qianxun WiFi" network, and tap "Connect". The system will then display a Qianwu Qianxun Configuration Window; select "Configure Wi-Fi", choose the Wi-Fi network to which you wish to connect, and tap "Connect". When the Qianwu Qianxun indicator light changes from red to a colored light, it indicates that the configuration was successful.



2. Mobile Device Base Station Management

Open the Qianwu Qianxun app homepage and tap "Add" in the top-right corner. Step 1: Select the "Base Station" category. Step 2: Enter the ID number corresponding to the card-reading base station. Step 3: Select the base station you wish to bind and tap "Bind".



After adding a base station, users can view detailed information about the bound base station on the Home Screen's Base Stations list – including the base station's battery level, online status, base station name, base station ID, number of bound tags, and the online status of those tags. The battery health icon is green when the battery level is sufficient and red when the battery level is low; the online status icon is green when the base station is online and red when it is offline.



3. Mobile Device Electronic Fencing Feature

Click to view base station details; this page displays specific information about the base station, including its ID, location, online status, battery level, lighting mode, and the tags that have been bound to it.

Tap to enable the Electronic Fence feature; swipe the button to adjust the radius of the base station fence, then tap "Confirm." The electronic fence is defined using the Qianwu Qianxun base station as its center, with the specified distance set as the radius for fence detection.



Click on "Batch Alarm Settings" and select the tags that should be subject to electronic fence management; tags not selected will not be subject to electronic fence restrictions. Then, go to "Alarm Mode Settings" to choose from various alarm mechanisms.



When the tag triggers an electronic fence alarm, the system sends an alert notification to the user's mobile device; the user can then promptly view detailed information, including the tag ID, base station ID, trigger time, and trigger method.



4. Mobile Device Tag Management

Open the Qianwu Qianxun app homepage and tap "Add" in the top-right corner. Step 1: Select the "Tags" tab. Step 2: Enter the ID number corresponding to the card-reading tag. Step 3: Select the tag you wish to bind and tap "Bind". If the tag contains a barcode, you can also tap the "Scan" function located on the right side of the search bar to quickly scan the barcode/QR code and complete the binding process.



Users can click on a previously added base station to access the Attachment tab and select an unbound tag for quick binding.



Once the binding is complete, the tag will appear in the tag bar on the home screen. By selecting the desired tag, you can view its detailed information, including name, notes, ID, battery level, online status, and more. To call a tag, simply click the "Call" function and select the desired calling method; clicking on the tag's location will display its signal coverage area on the map.



5. Mobile Map Management

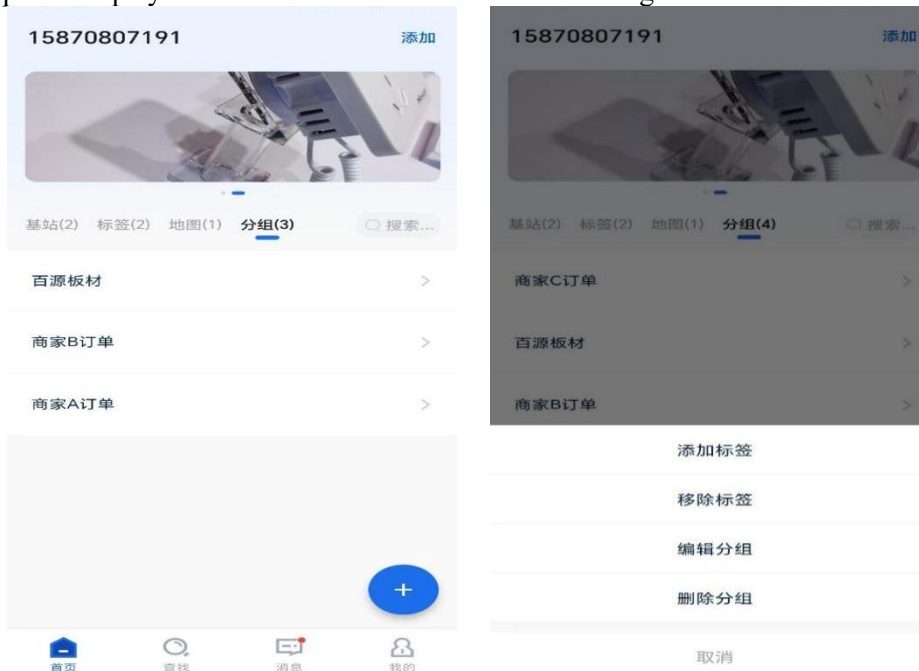
Open the Qianwu Qianxun app's home screen, tap the Map tab, and select "Add Map." Import your 2D floor plan, enter the actual length and width, then choose your assigned user ID. Once completed, tap "Add" in the bottom-right corner of the screen. Each account can add multiple maps.



6. Mobile Device Group Management

Open the Qianwu Qianxun app homepage, tap the Grouping menu, then tap the plus icon in the bottom-right corner of the screen. Enter a name for your tag group and tap Confirm to add it; you can assign the same tag to multiple different groups. Long-press a group name to edit it – this allows you to add or remove tags from the group, edit the group settings, or delete the group.

When you need to quickly locate a specific group, simply enter the group name in the search field on the search page to find the corresponding group information. Clicking on the group will display all the information associated with its tags.



10. Companion nameplate labels and audio-visual electronic tags

1) WE-T32K Personnel Statistics Electronic Nameplate Tag



A 300 mAh lithium-ion battery can operate at a frequency of one discharge per 5 seconds for a period of 5 years.

2) WE-T52 Audio-Visual Alert Electronic Tag



750 mAh rechargeable lithium-ion battery – for normal use, recharge once per year (can be fully charged in 30 minutes using a power bank).

3) WE-T56 Audio-Visual Alert Electronic Tag



A CR2032 button cell battery (280 mAh, replaceable); replace the battery every six months under normal usage conditions. Alert sound: 95 dB.

4) WE-T51 Audio-Visual Alert Electronic Tag



One ER14505 rechargeable battery (replaceable) – typically lasts for 3 years of use – features excellent water resistance. The device includes a "Find/Confirm" button; once located, press this button to automatically terminate any ongoing calls.

5) WE-TLED10 Audio-Visual Alert Electronic Tag



The WE-THP10 electronic tag is equipped with a 650 mAh rechargeable lithium-ion battery; a single charge provides sufficient power for 3 months or 1,000 search operations. When the battery level is low, a low-battery alert is triggered; the device can still be used for an additional month after the battery is depleted. The tag can emit three types of light signals – red, green, or alternating red and green – and features three different alert sound levels: 60 Hz, 90 Hz, and 130 Hz.

6) WE-TLED20 Audio-Visual Alert Electronic Tag

Two AA alkaline batteries provide up to 5 years of standby time and support 96 hours of audio and visual alerts. For every minute of incoming call, the standby time decreases by 8 hours.

Supports seven-color lighting (red, green, blue, yellow, purple, cyan, and white); the sound volume can reach up to 95 dB. Equipped with a touchscreen "Confirm Button" – once located, simply tap this button to automatically terminate the call.