Positioning server WE-LS01

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catalogue：

I. OVERVIEW

The positioning server connects to positioning base stations, receives real-time tag data from each station, performs data processing to obtain location information for each tag, and ultimately reports this information to a third-party application platform. The third-party platform not only identifies the tags' locations but also enables users to trigger electronic tags (sound-light activated tags only) via the server. Users can quickly locate the tags through audio-visual alerts.

By utilizing location server management software, organizations can design customized regional maps, strategically position base stations, monitor real-time status of each base station, and track tag locations on the map. This streamlined approach enables efficient deployment of positioning systems. Once the data push network address is configured on the location server, it continuously transmits positioning data to third-party platforms. Upon receiving this data, client platforms can swiftly implement various location-based personalized services.

In addition to using our free management software to manage the positioning system, customers can also realize comprehensive control of the positioning system equipment through the open management interface (protocol), develop their own positioning system management functions, and fully integrate the positioning system as a module component into their own system platform.

II. MAIN FEATURES

◆ It can access no less than 500 positioning base stations at the same time.

◆ It can collect the location information of no less than 10,000 electronic tags at the same time.

◆ Four-core Cortex-A7 processor, 1.2GHz main frequency, 8G core storage space.

◆ Industrial temperature range, suitable for all kinds of harsh environments.

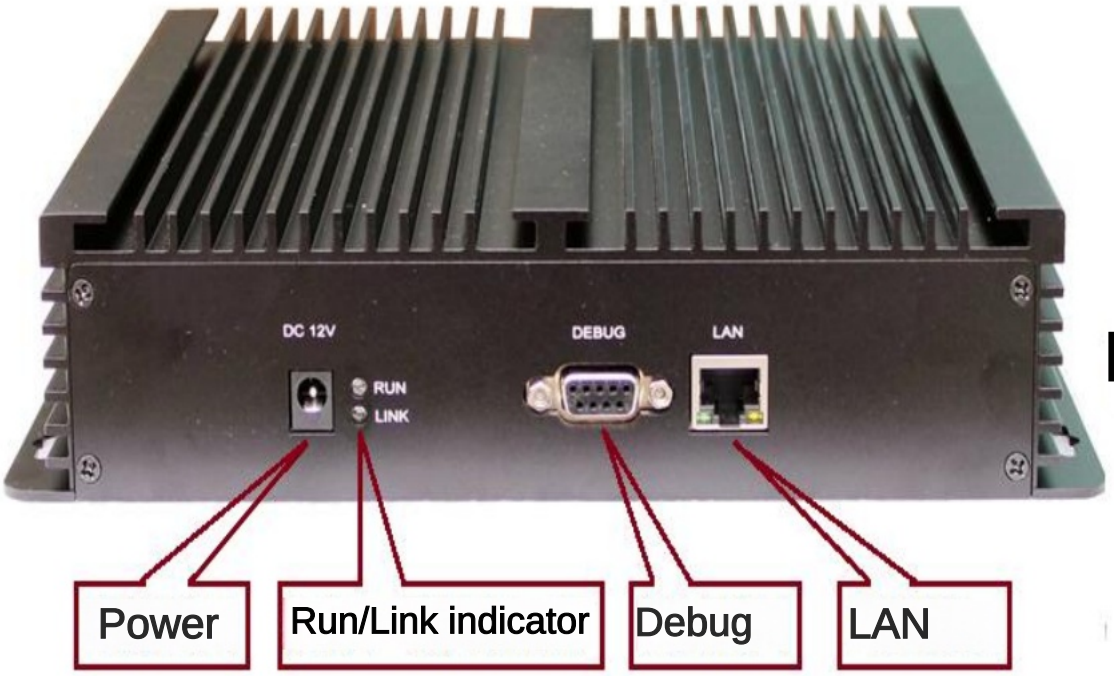
◆ Embedded Linux operating system, stable and reliable.

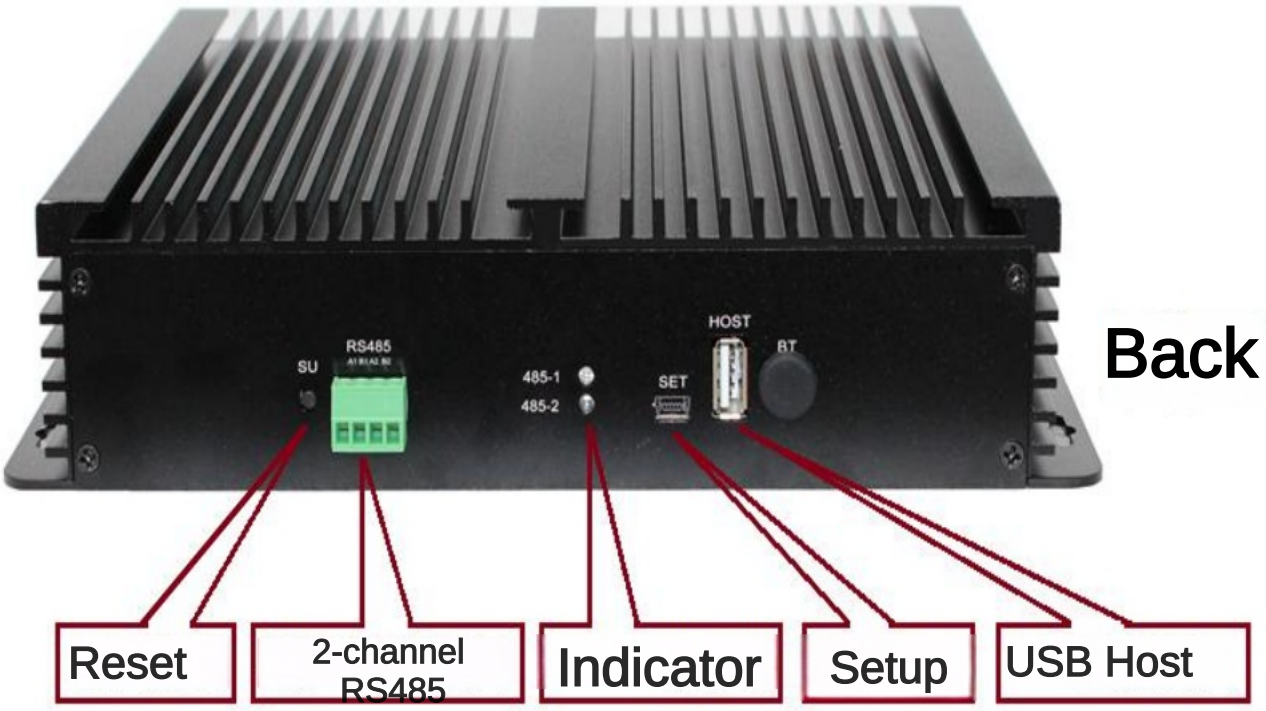
◆ 9-30V wide voltage supply, effective filtering of power supply ripple.

◆ The communication interface is isolated inside and outside, with EMC protection and electrostatic protection.

◆ All-aluminum ice spike cooling chassis, all enclosed without fan, suitable for all kinds of harsh environments.

◆ Open management protocols that fully integrate location functionality into their own system platforms.


DC 12V
RUN
LINK
DEBUG
LAN
Front
Power
Run/Link indicator
Debug
LAN

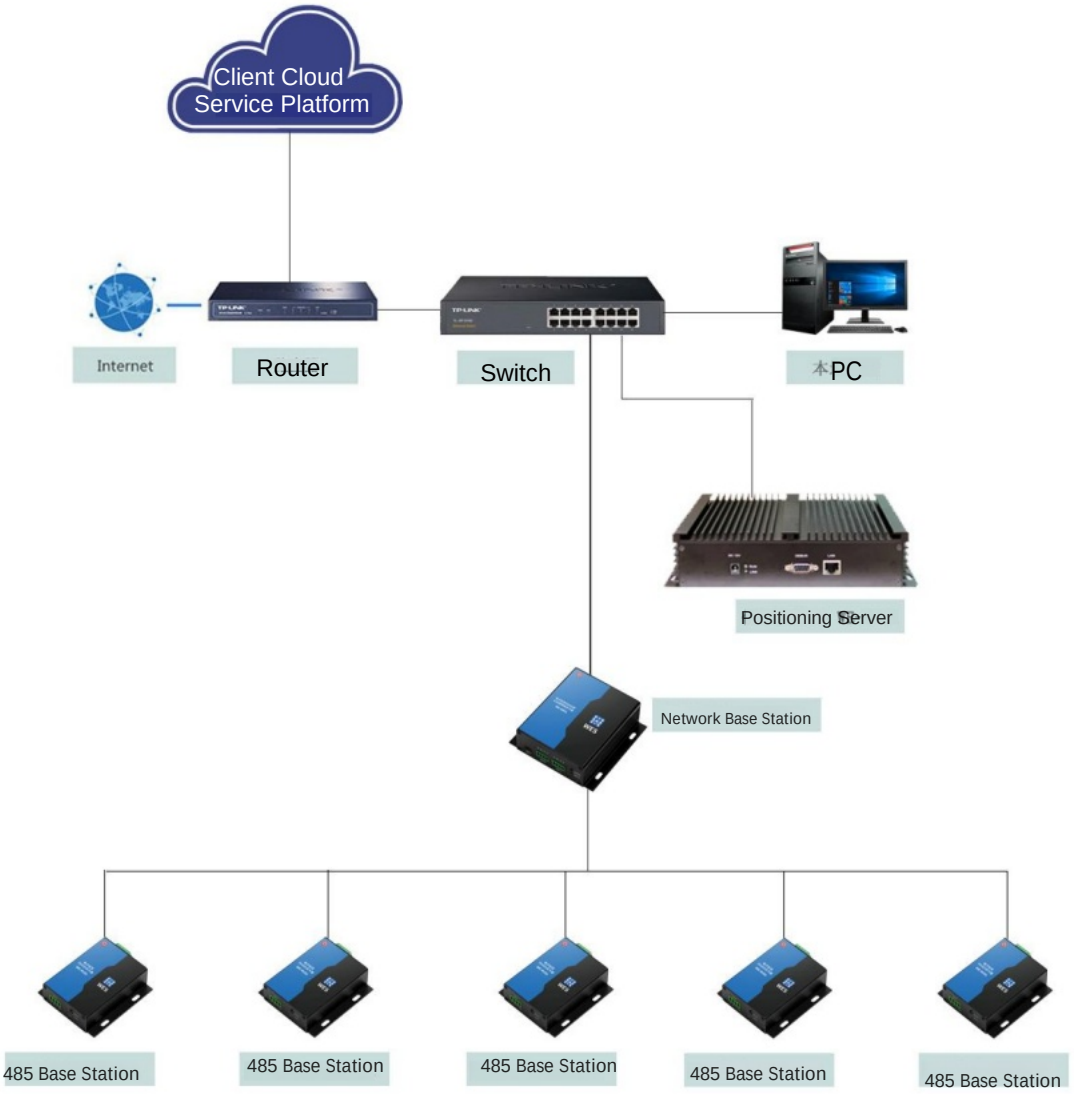

SU
RS485
485-1
485-2
SET
HOST
RT
Back
Reset
2-channel RS485
Indicator
Setup
USB Host

III. Technical parameters

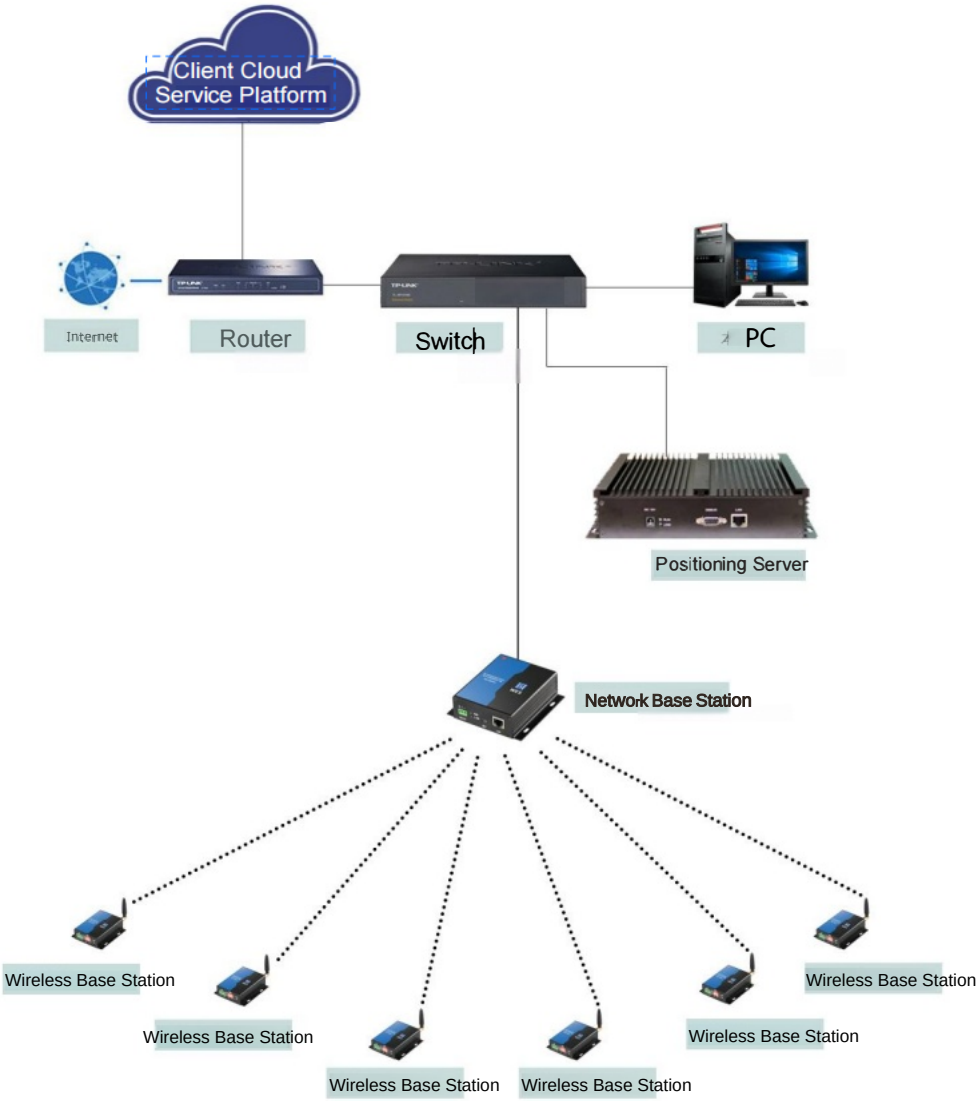
project	component	explain
central processing unit	CPU	Four-core Cortex-A7 processor, 1.2GHz
	internal storage	1G RAM
	memorizer	8G ROM
Ethernet	LAN	100 megabit Ethernet interface
USB joggle	MINI	Port to USB is used to set network parameters.
	HOST	reserve
gorge line	RS232	DB9 debugging serial port.
	RS485-0	RS485 interface 0, extended function.
	RS485-1	RS485 interface 1, extended function.
pilot lamp	RUN	Light for 1 second, off for 1 second, indicating that the equipment is running normally.
	LINK	Connect to the cloud service platform, and the lights will be on.
source	voltage	DC12V
	power	The power of the whole machine does not exceed 30 watts
size		234mm*200mm*52mm
weight		1500 grams
work environment	temperature	-20℃~+60℃
	humidity	No more than 95% (no condensation)

IV. Network topology

1. Wired networking



2. Wireless networking



First, deploy positioning base stations in the target area. Using a management client, the data from these base stations is uploaded to the location server. The server then processes the received tag information, calculates each tag's coordinates, and transmits the location data to the client's application platform

When deploying positioning base stations, operators can flexibly select models with different transmission interfaces as needed, including network readers, wired readers, and wireless readers. Notably, both wired and wireless readers cannot connect directly to the location server. Instead, they must first establish a connection through the corresponding network reader before accessing the server.

model	joggle	explain
WE-RN01	Ethernet	There is a RS485 extension bus interface
WE-RWN02	Ethernet	There is a 433M wireless extension interface
WE-RU01	RS485 bus	Can be connected to WE-RN01 positioning
WE-RW01	433M Wireless	Can be connected to WE-RWN02 positioning

V. Modify IP Address

1. Connect the computer with USB cable

Connect the inventory server's "SET" interface to a computer using a USB cable (MiniUSB port). Open the device manager on your computer and locate the newly added "USB-SERIAL CH340" device under the [Ports] category. Note down the COM port number of this device.

If the device manager only shows one "exclamation mark device", it means that the computer cannot recognize the USB serial port device, and the corresponding driver needs to be installed.

Driver download link: http://www.wch.cn/downloads/CH341SER_EXE.html

2. Open the parameter setting software

Open the parameter setting software, select the corresponding serial port, click the "Open serial port" button. As follows:

The software interface is displayed as follows after successful opening:

The status in the lower left corner of the software is shown as "connected".

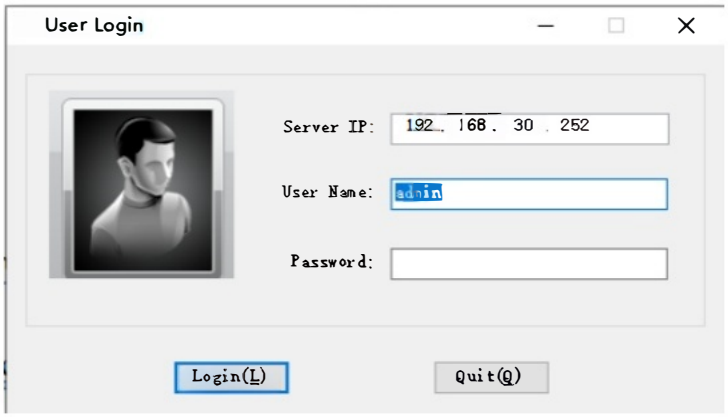
You can perform the following operations:

1） Set the IP address. This server should not enable "DHCP" and must use a static IP.
2） View and modify the administrator password.
3） Simple network debugging tools. For example, "query network information", "query routing information", "ping destination IP address" and other operations.

VI. Login server

The administrator runs the "Location Services Manager" executable file on the local computer.

The user login interface will pop up. Enter the "user name" and "user password" to log in.



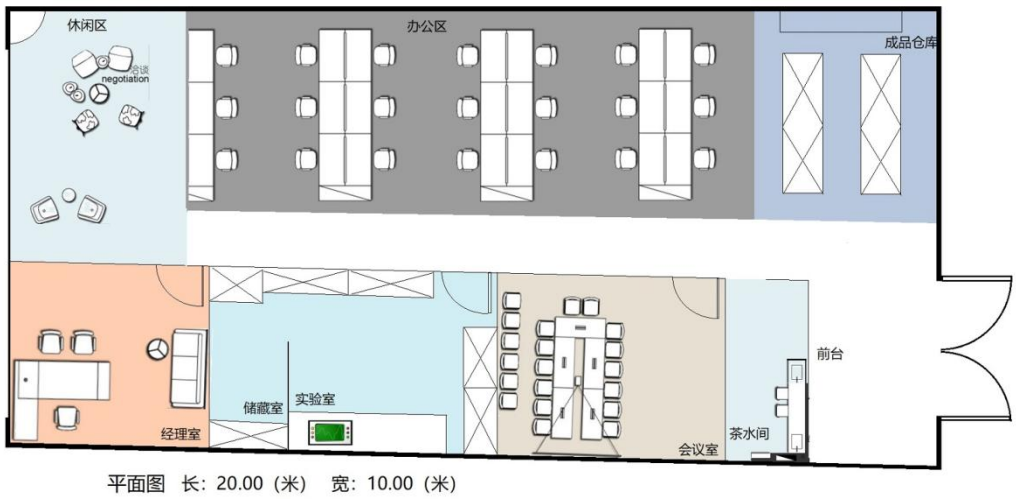
The default login account of the location server is "user name: admin, user password: admin", and the user can change the user password after successful login.

If you forget your password, you can use the [parameter configuration tool] to view and modify it.

VII. MAPS OF PLANNING

Users need to draw a map of the area to be monitored, which supports various image formats such as JPG, PNG, BMP, etc. If there is a plan made by CAD software, you only need to export and save it as an image file.

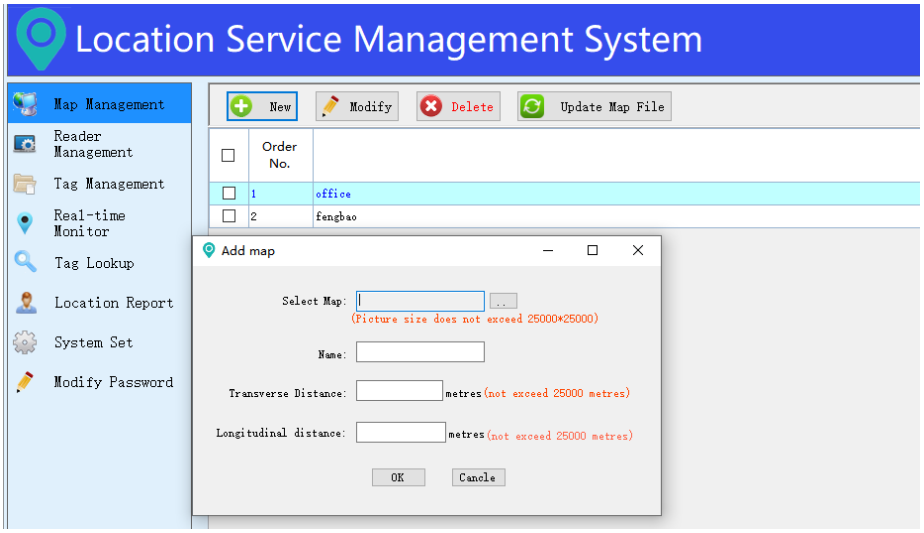
If you draw such a picture, save it as an "demo.jpg" file.



平面图 长：20.00（米） 宽：10.00（米）

Copy the map file to the "map" directory of the client software.

Under the "map management" navigation bar of the client software, a new map is added. Select the prepared map file, give it a name, and input the actual length and width corresponding to the map, as shown in the figure below:



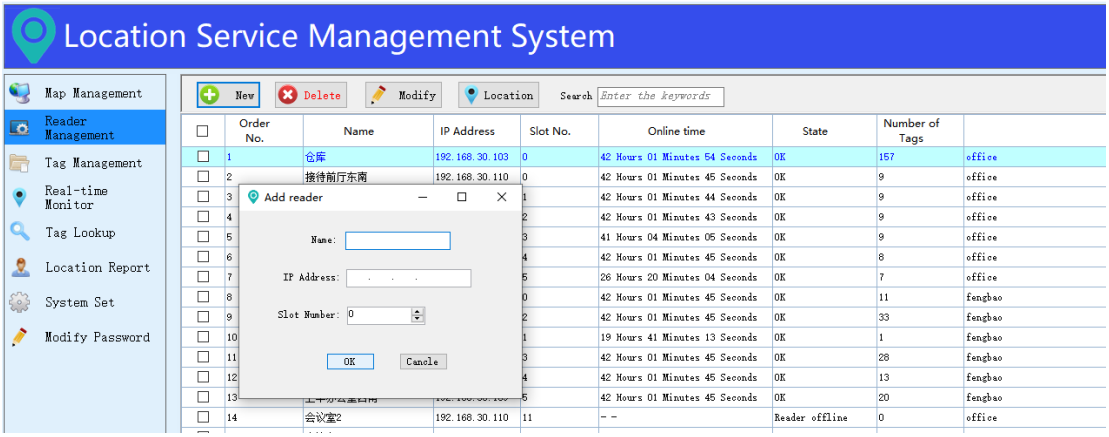
In "Map Management", you can see how many base stations are marked on each map and how many tags are currently present.

Transverse Distance	Longitudinal Distance	Map File	Map ID	Number of Readers	Number of Tags
77.66	39.96	OK	4	6	0

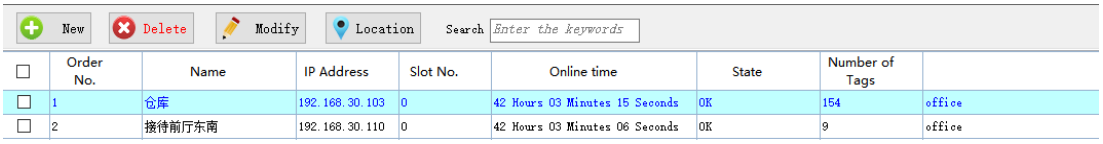
VIII. Managing base stations

1. New base stations

Add the corresponding base station in the "R e a d e r Management" navigation bar, and input the base station name, IP address, and branch number, as shown below:

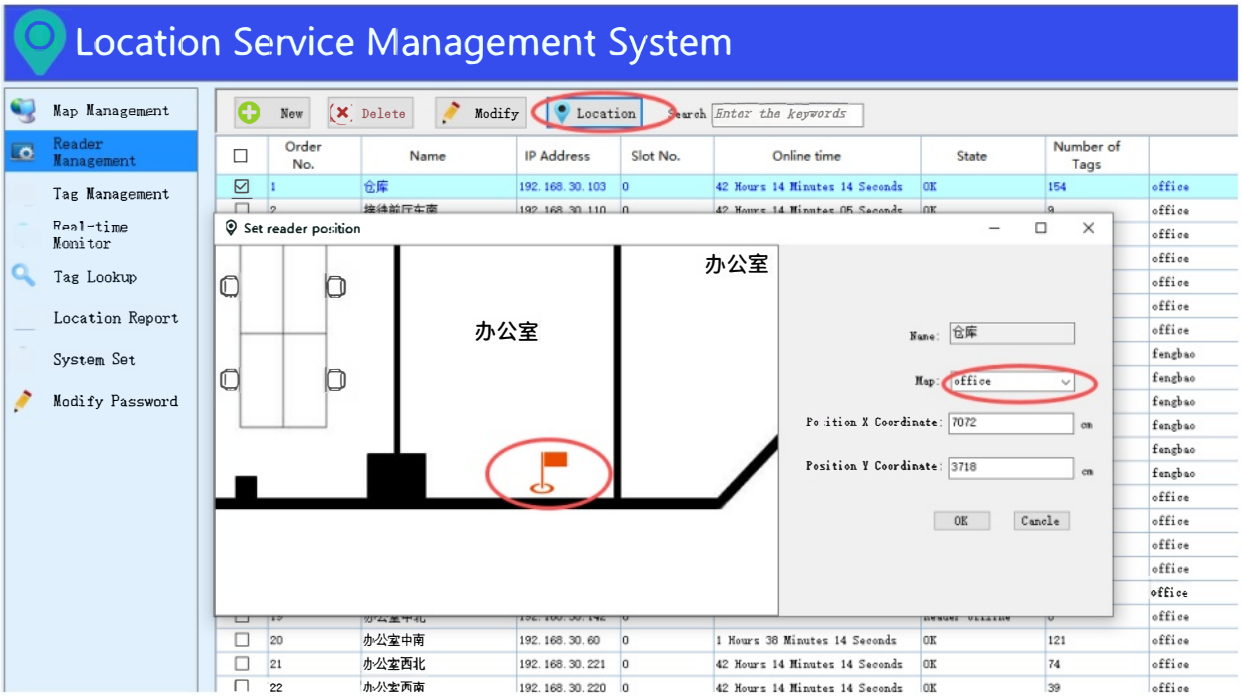


The continuous operation time of the base station can be seen, which is convenient for equipment maintenance.



2. Mark the base station on the map

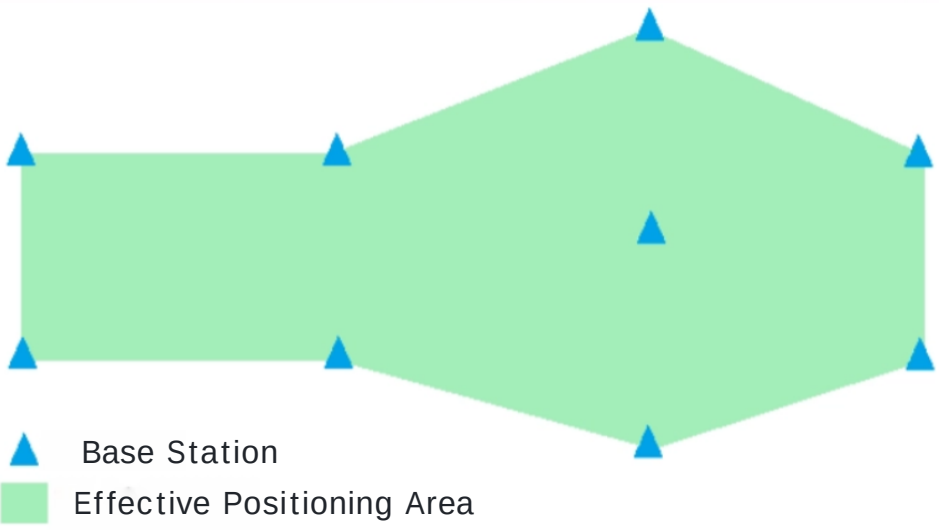
In the "Reader management" navigation bar, select the base station to be marked, click the "Location" button, in the dialog box that pops up, select the map to which the base station needs to be marked, drag the map to the corresponding position, and click the mouse on the specific location. As shown below:



3. Effective positioning of regions

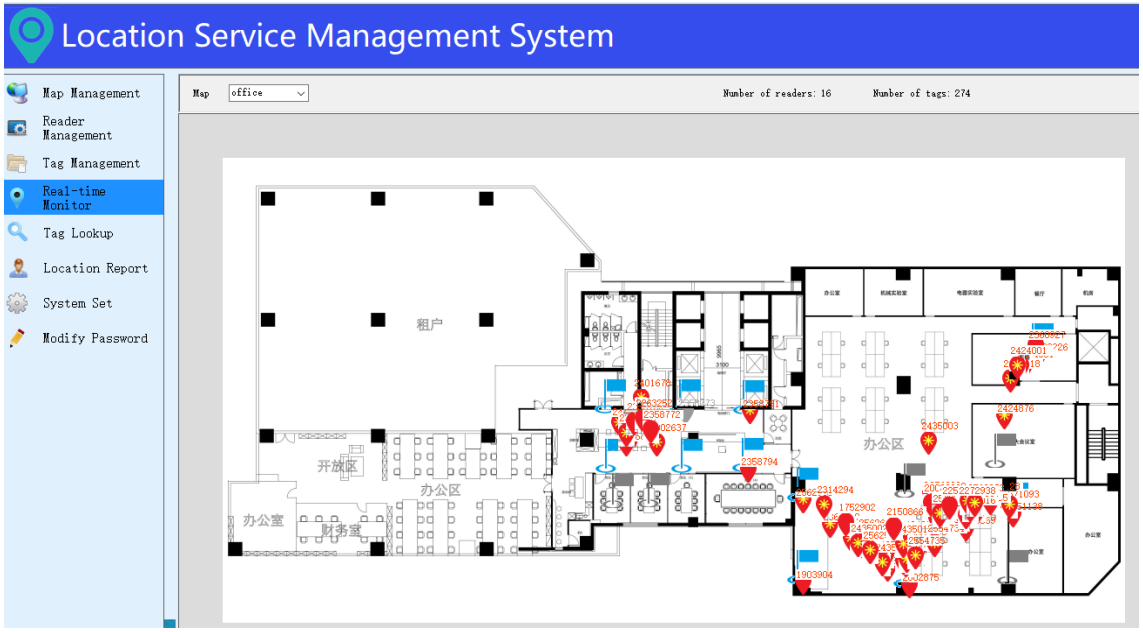
Only the area surrounded by the base station is an effective positioning area. If the actual location of the tag is not in the effective positioning area, the accurate coordinate placement cannot be obtained. The user needs to deploy the base station location according to the actual project requirements

The effective positioning area is shown in the following figure:



IX. REALTIME MONITORING

Enter the "Real-time Monitor" navigation bar and select the map you want to observe. You can then see what tags are on that map. If the actual location of a tag changes, the display position of that tag on the map will change accordingly.



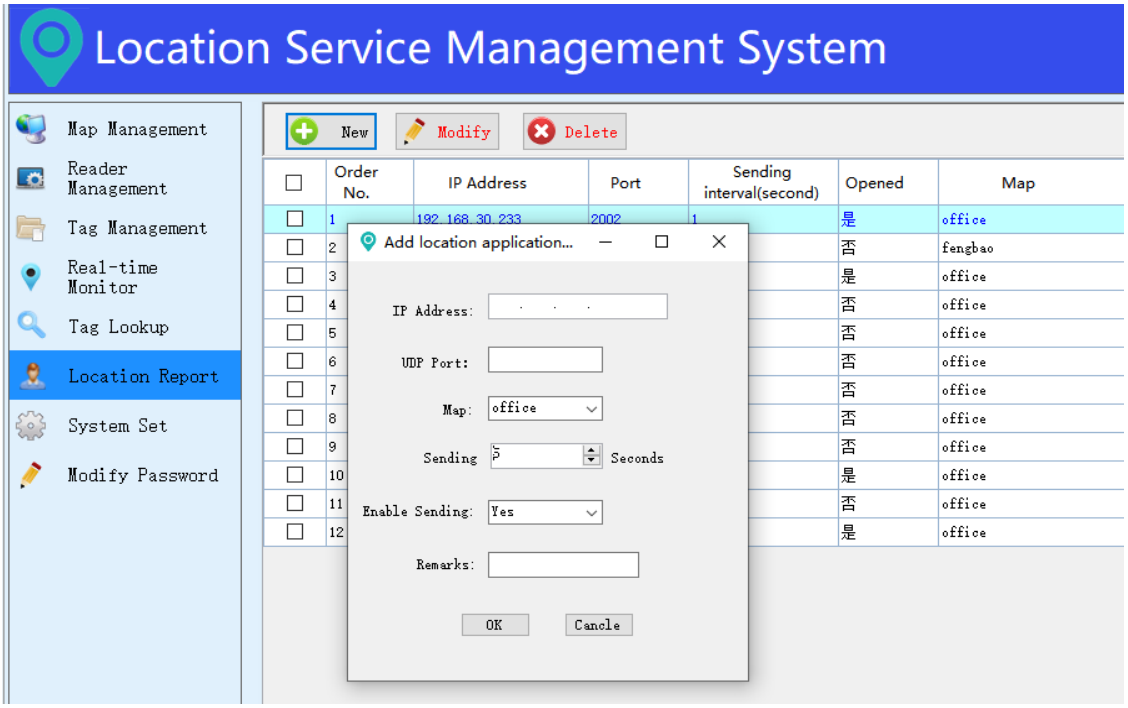
The blue triangle in the figure is the base station location and the red dot is the label location.

You can zoom in or out by clicking the "+" and "-" buttons

10. Report tag location data (XML)

Add the network platform receiving address of location data to the "location report" navigation bar, and the address can receive the corresponding tag location data continuously.

Click the "NEW" button, enter the IP address of the network receiving platform, UDP port number, map name, sending interval seconds and other parameters in the dialog box that pops up, and finally click the "ok" button. As shown in the following figure:



After the above operation, the network UDP port 8080 of the client server with the IP address "12.58.7.66" will receive all the label information related to the "demonstration map" every 5 seconds.

The location server can be used to receive location information using the network debugging tool. For example, open the NetAssist network debugging tool.

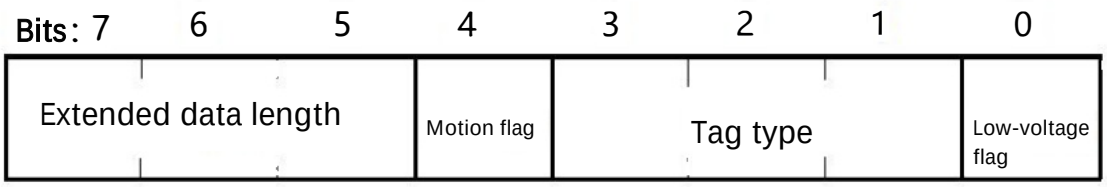
Select "UDP" for the protocol type, the IP is the local IP address of the computer by default, enter the UDP port number for receiving data, and click the "Connect" button. As shown in the figure below:

You can see the location data received in XML format.

```
<?xml version="1.0" encoding="UTF-8"?>
<labels ver="1.0"  map="demo">
<label id="1802232"><x>1568</x><y>666</y><attr>32</attr><extend>01</extend></label>
  <label id="1802600"><x>1343</x><y>413</y><attr>00</attr></label>
  <label id="1705992"><x>1641</x><y>624</y><attr>00</attr></label>
  <label id="1802630"><x>1236</x><y>462</y><attr>18</attr></label>
  <label id="1803184"><x>1892</x><y>601</y><attr>00</attr></label>
  <label id="1802869"><x>942</x><y>679</y><attr>00</attr></label>
  <label id="1802241"><x>1736</x><y>433</y><attr>32</attr><extend>03</extend></label>
</labels>
```

The above data packet shows that there are 7 tags on the "demo" map, and indicates the ID and coordinate information of these 10 tags. The coordinates (x, y) are in centimeters. The origin of the coordinates is in the upper left corner of the map.

"attr" is the byte data of the tag's attribute, expressed by two hexadecimal numbers per byte (8 bits). Details are as follows:



Position 0 undervoltage indicator. 1: Undervoltage 0: Normal

Position 1-3 tag types. 0: normal tag 1: audio-visual tag 2: SMS tag 4: sensor tag

Position 4 motion sign. 0: label stationary 1: label moving (label needs to have motion detection sensor)

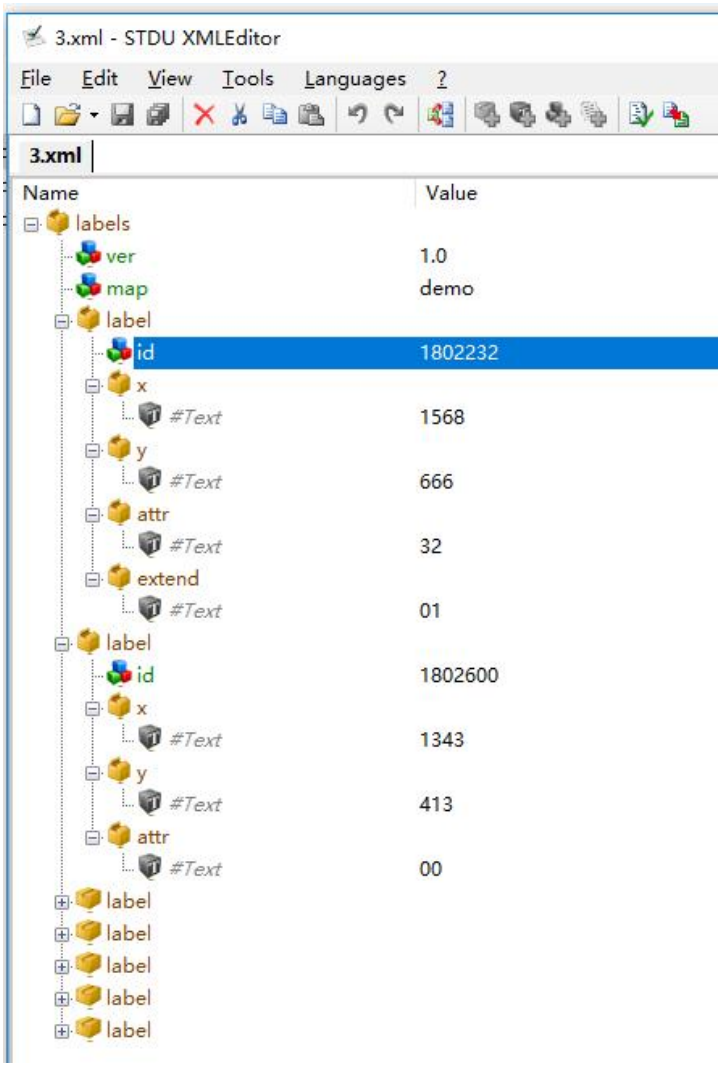
Position 5-7 Extended data length. When necessary, the tag can upload some extended data (such as humidity, humidity, etc.) The extended data area is immediately followed by the attribute byte, and the length can be 0-7 bytes.

' Extended" refers to the tag's extension byte, which consists of 0-7 bytes. The length of the extended data is specified in the attribute byte and can carry tag-specific information such as temperature or humidity measurements. This field may contain up to 7 bytes or remain empty. The hexadecimal representation uses two digits per byte

Save the data as a file with the extension ".xml" and you can open it directly in your browser.

```
<?xml version="1.0" encoding="UTF-8"?>
- <labels map="demo" ver="1.0">
  - <label id="1802232">
      <x>1568</x>
      <y>666</y>
      <attr>32</attr>
      <extend>01</extend>
    </label>
  - <label id="1802600">
      <x>1343</x>
      <y>413</y>
      <attr>00</attr>
    </label>
  - <label id="1705992">
      <x>1641</x>
      <y>624</y>
      <attr>00</attr>
    </label>
  - <label id="1802630">
      <x>1236</x>
      <y>462</y>
      <attr>18</attr>
    </label>
  - <label id="1803184">
      <x>1892</x>
      <y>601</y>
      <attr>00</attr>
    </label>
  - <label id="1802869">
      <x>942</x>
      <y>679</y>
      <attr>00</attr>
    </label>
  - <label id="1802241">
      <x>1736</x>
      <y>433</y>
      <attr>32</attr>
      <extend>03</extend>
    </label>
</labels>
```

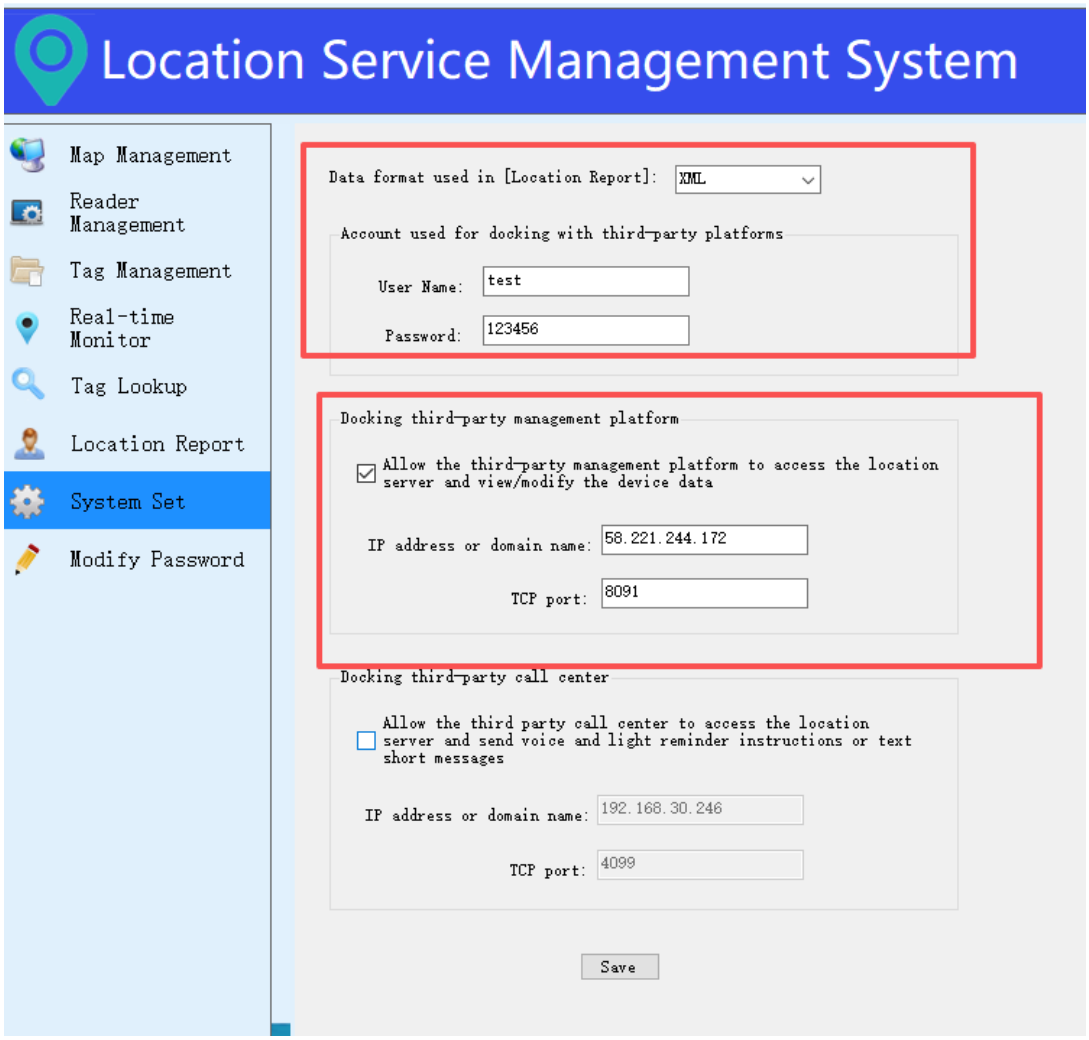
You can also open files with an XML editor.



XI. Reporting tag location data (binary)

Location servers can use [XML description] or [binary structure] to report label location information. Compared with each other, XML description protocol is simple to connect, but the data parsing operation is large, and the data content is lengthy, which is not conducive to the use of large data volume.

Using binary structure communication, the structure is simple, the tag data contained in the data packet of the same length is more than five times, and the operation required for parsing is small, which is suitable for large volume applications.



In the navigation bar of [System Settings], set the data format used by location reporting to "binary", and the location service will report the tag data in binary.

Set the address of the server and test the capture tag data on the server. XML and binary are the same, so I won't repeat it here. See the previous section for details.

The binary protocol is as follows:

1) Label location data reporting

Message unit	Length (bytes)	explain
Guide bytes	2	Fixed 0X55 0XAA
Message name	1	0
Message length	2	"Message Length" The length of the following content (excluding the final CRC16 checksum)
client ID	4	continue to have
equipment ID	4	continue to have
map ID	4	
Number of label data	1	
Tag 1 Data	20	label ID
Tag 2 Data	20	
.....		
Tag N Data	20	
CRC16 checksum		CRC16 checksum for all data except the initial "guiding byte"

The tag data (20 bytes) is detailed as follows:

field	Length (bytes)	explain
label ID	4	
X coordinate	4	unit CM
Y coordinate	4	unit CM
Label attributes	1	See the card reader manual for details
Tag extensions data	7	Different labels will have different interpretations.

For example, a binary data packet received is as follows:

55 aa 00 01 4d 00 00 00 00 00 00 00 00 00 00 01 10 00 00 27 4b 00 00 02 a5 00 00 00 e1 20 a0 00 00 00 00 00 00 00 1d 01 ce 00 00 04 41 00 00 02 00 2c 31 00 00 00 00 00 00 00 20 e7 83 00 00 06 98 00 00 02 a7 20 90 00 00 00 00 00 00 00 1e ce 30 00 00 04 dd 00 00 00 ec 20 a0 00 00 00 00 00 00 00 21 69 8f 00 00 06 6a 00 00 02 60 22 a0 00 00 00 00 00 00 00 21 69 90 00 00 06 73 00 00 02 8b 22 90 00 00 00 00 00 00 00 1d 17 fd 00 00 06 53 00 00 02 2c 22 60 00 00 00 00 00 00 00 21 69 91 00 00 06 5f 00 00 02 f4 22 a0 00 00 00 00 00 00 00 1d 18 01 00 00 06 96 00 00 02 61 22 70 00 00 00 00 00 00 00 1d 17 ff 00 00 06 4e 00 00 02 52 22 60 00 00 00 00 00 00 00 21 0c e3 00 00 04 12 00 00 01 60 22 80 0c 6e 00 00 00 00 00 21 0c e8 00 00 03 28 00 00 02 1c 22 80 0c 6e 00 00 00 00 00 21 0c ea 00 00 03 04 00 00

00 e0 22 70 0c 6e 00 00 00 00 00 21 0e bd 00 00 06 9b 00 00 02 ad 22 a0 00 00 00 00 00 00 00 21 0c e7 00 00 04 7d 00 00 00 ea 22 80 00 00 00 00 00 00 00 21 0c e5 00 00 04 b3 00 00 00 f6 22 70 00 00 00 00 00 00 49 d6

The analysis is as follows:

55 aa: leading byte

00: Message name (location report)

01 4d: Message length (333 bytes)

00 00 00 00: Customer ID (0)

00 00 00 00: Device ID (0)

00 00 00 01: Map ID (1)

10: Number of labels (16 labels of data)

00 00 27 4b 00 00 02 a5 00 00 00 e1 20 a0 00 00 00 00 00 00: Data for label 10059

00 1d 01 ce 00 00 04 41 00 00 02 00 2c 31 00 00 00 00 00 00: Data for tag 1901006

00 20 e7 83 00 00 06 98 00 00 02 a7 20 90 00 00 00 00 00 00: Data for tag 2156419

00 1e ce 30 00 00 04 dd 00 00 00 ec 20 a0 00 00 00 00 00 00: Label 2018864 data

00 21 69 8f 00 00 06 6a 00 00 02 60 22 a0 00 00 00 00 00 00: Data for tag 2189711

。 。 。 。 。 。

.....

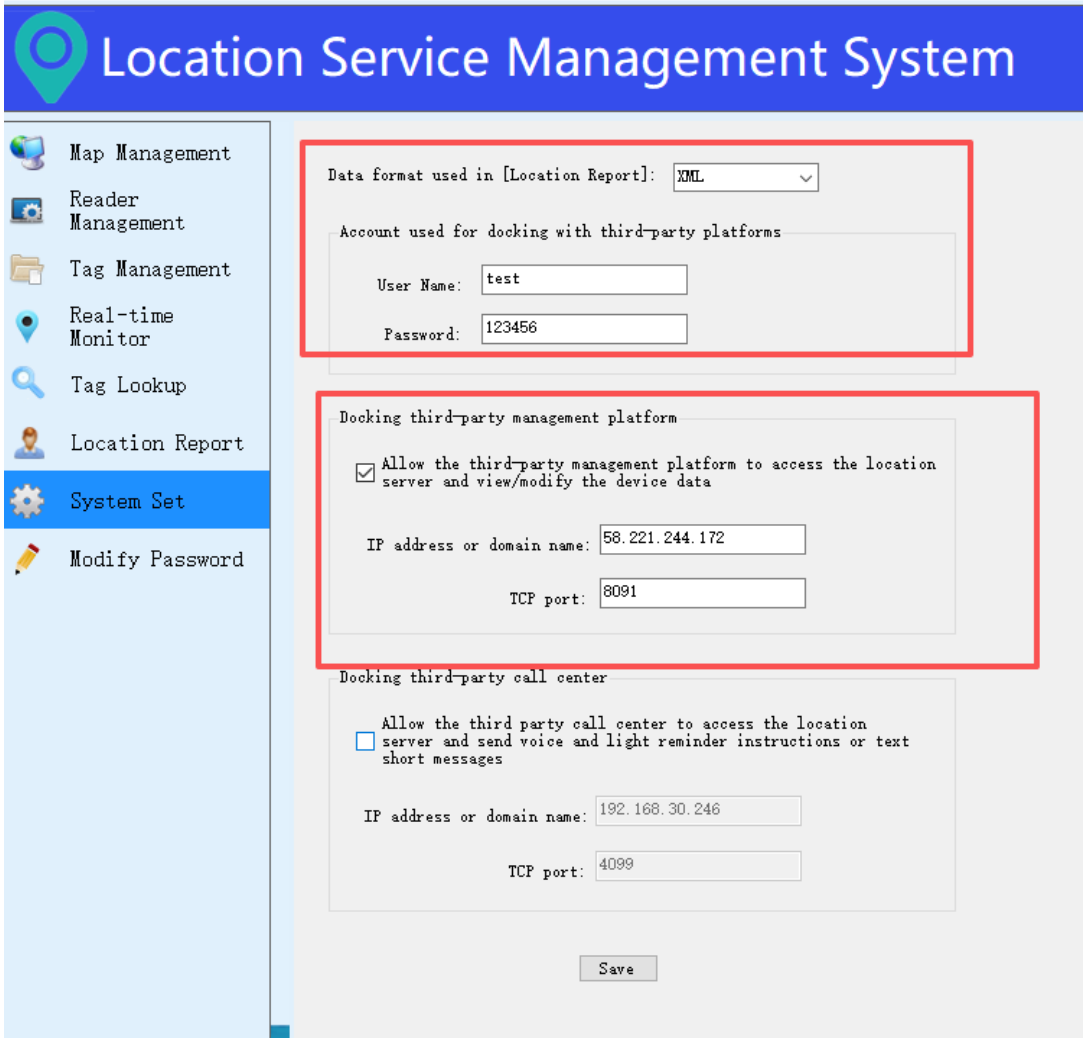
49 d6:CRC check value (CRC16 check value of other data except the "guiding byte" at the beginning)

XII. Connect to third-party management platforms

Users who only need to receive tag positioning coordinates without managing the positioning devices (such as modifying base station configuration data or monitoring their operational status) can skip this section. By using the manufacturer-provided default management client software locally, they can effectively manage and maintain the positioning devices. Additionally, mapping the location server's management port (TCP:2572) to the public network enables remote device maintenance.

This chapter is required if the user platform wants to receive not only tag positioning coordinates but also understand the operating status of the positioning device.

The client platform not only acquires tag location data from the positioning server but also enables comprehensive control over positioning system devices through open protocol integration, achieving full integration of positioning systems into the platform. For detailed protocol specifications, please refer to the [WE-LS01 Positioning Server Product Documentation\6 Interface Management Platform Protocol\Positioning Server Interface to Third-Party Management Platform Protocol.pdf].

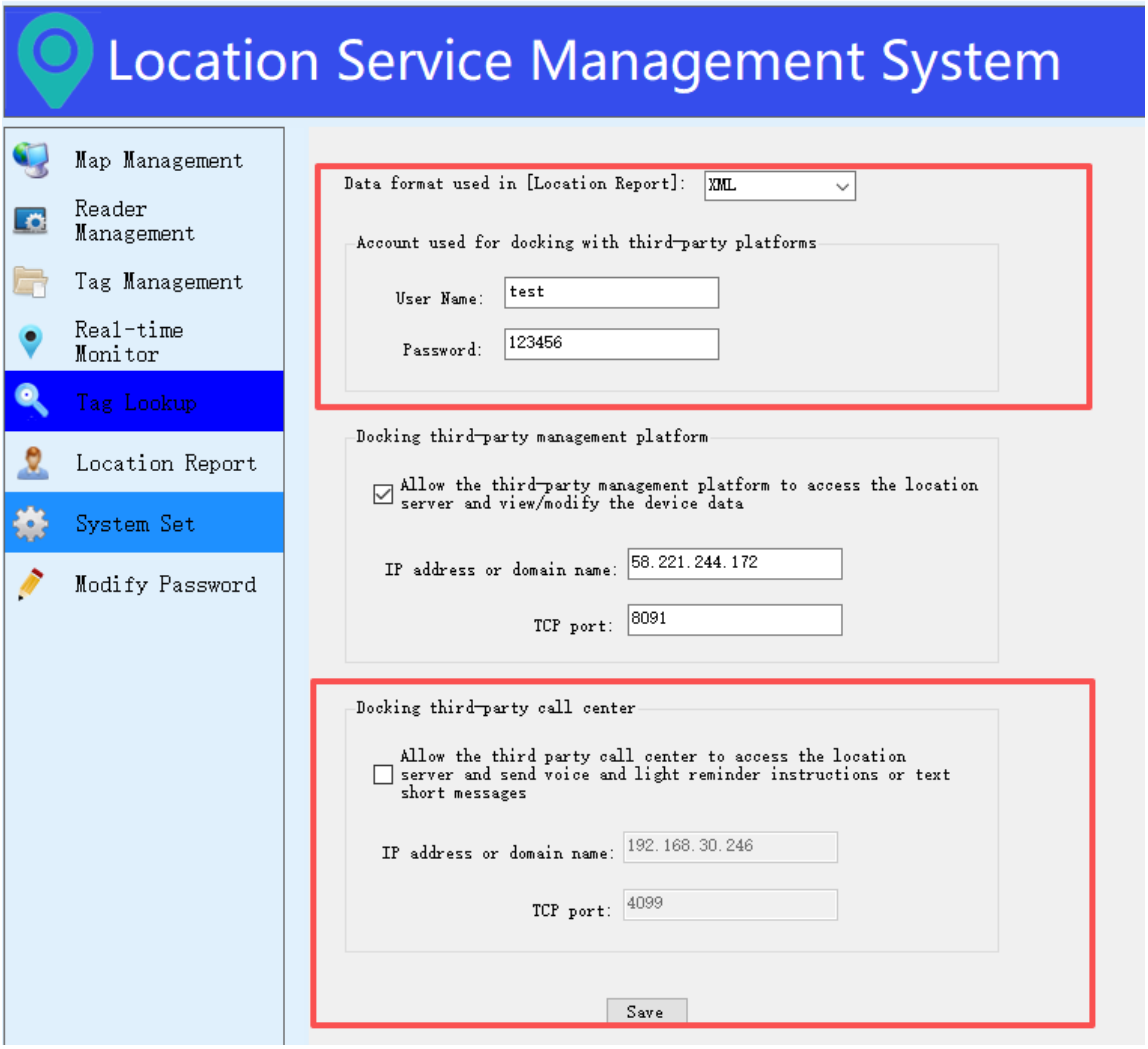


In the [System Settings] of the navigation bar, enter the account (name and password) assigned to the location server by the platform, and the address of the third-party management platform (IP/ domain name + port number), and the location server will actively access the platform.

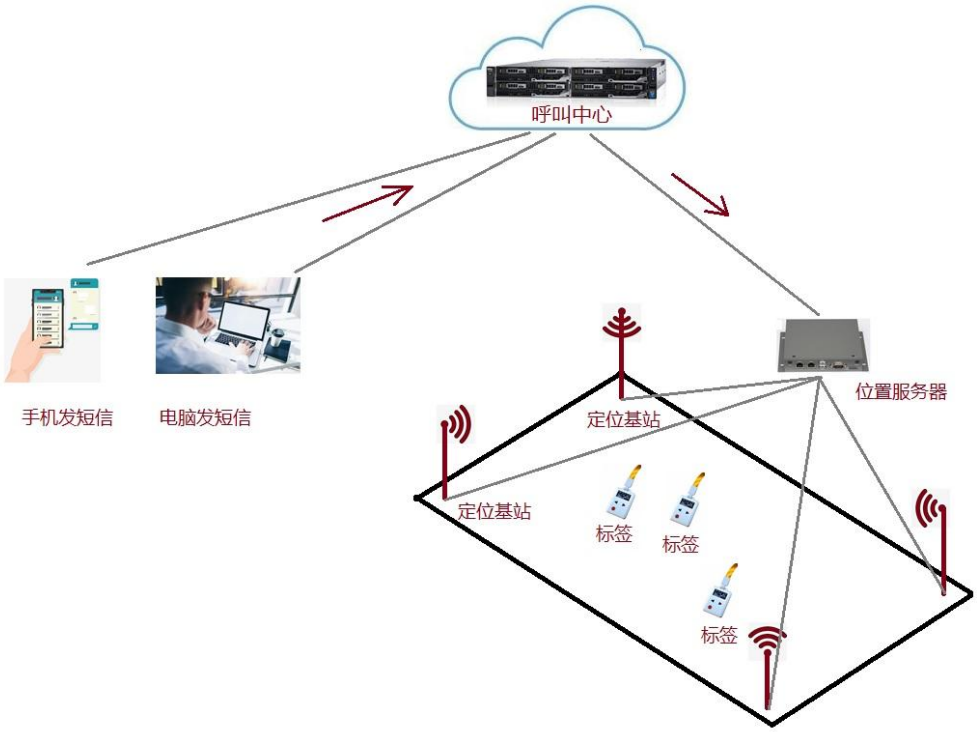
XIII. Connect to third-party call centers

When third-party platforms need to locate items (using audio-visual tags) or send employee information notifications (using SMS tags), they must develop their own call centers. These third-party call centers connect with location servers through open protocols, sending call or notification commands to the audio-visual tags or SMS tags.

For the specific protocol document, please refer to [WE-LS01 Product Data\5. Connection Call Center Protocol\Location Server Connection Call Center Communication Protocol.pdf]



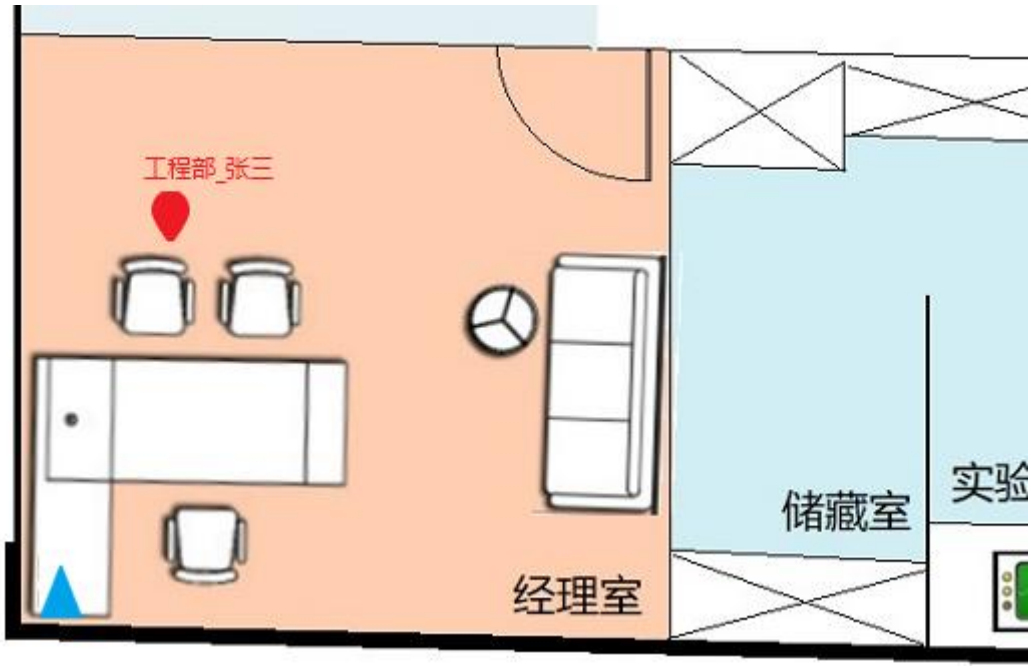
In the [System Settings] of the navigation bar, enter the account (name and password) assigned to this location server by the platform, and the address of the third-party call center (IP/ domain name + port number), and the location server will actively access the customer call center.

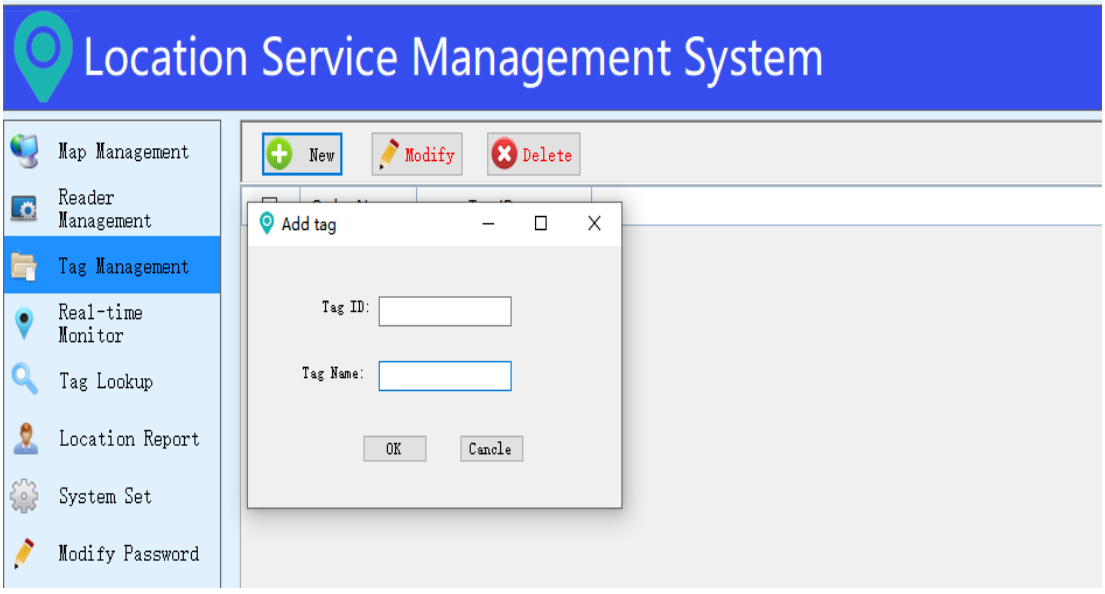


We provide a prototype of the implementation software and C++ source code for the call center. Users can easily implement their own call center platform by referring to our software source code.

XIV. Labeling

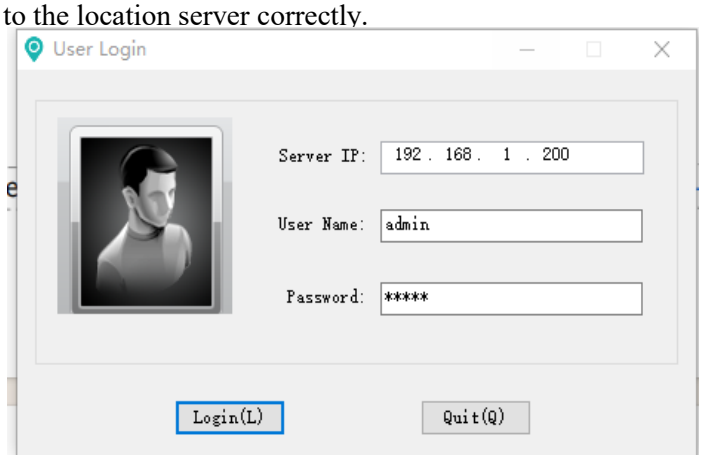
We can give each tag a name, so that on the "real-time monitor" page, the corresponding tag no longer displays the ID, but instead displays a more vivid alias.





15. Change the administrator password

When the user starts this software, he/she needs to input the user name and password to log in to the location server correctly.



You can modify the administrator's login password in the "Change Password" navigation bar.

If you forget your password, you can use the [parameter configuration tool] to view and modify it.