Side-mounted People Counting Device Quick Start Guide

Version 1.0

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1. Overview

The People Counting Sensor is designed to monitor changes in human occupancy and movement within a monitored area. Based on mmWave radar technology, it supports human presence detection, people counting, and target position output. The sensor transmits data to the cloud via the MQTT protocol, enabling scenario-based automation and real-time status reporting.

2. Network Configuration

Before connecting the device to the network, complete the following setup procedure:

1) Configure the server.
2) Connect the Wi-Fi module to the network.
3) Use a third-party MQTT client (e.g., MQTT.fx or MQTTX) to subscribe to the device topics. The default MQTT broker settings are:
   Broker: tcp://broker.emqx.io
   Port: 1883
4) Manually configure the detection range parameters.

2.1 Network Configuration Guide

2.1.1 Server Configuration and Network Configuration LED Status

Before integrating the radar device with the customer's platform, two setup procedures are required:

1) Configure the customer's MQTT server information.
2) Connect the device to the network and establish communication with the server.

Factory pre-configuration of the server address is supported. During mass production, the customer server information can be configured at the factory in advance. During on-site deployment, only network connection is required before use.

Sample devices do **not** include customer server settings by default. Before testing, please manually configure the server address and related MQTT parameters provided by the customer.

The MQTT connection information must be configured first, including the server address, Client ID, username, and password. This only needs to be configured once. The configuration information will be stored in the module.

The configuration procedure is as follows:

1) Press and hold the button for more than **10 seconds**. The module will create a hotspot named **RadarConfig-xxxxxxxxxxxx**. Connect to the hotspot. The browser will automatically open **192.168.0.1**. After the mobile phone is connected to the hotspot, the configuration page shown below will be displayed. Only the **Device ID** is displayed by default. All other information should be configured according to the

MQTT server settings.

2) Configure the corresponding parameters according to the MQTT server. After all information has been entered, click **Modify (First blue button)** to submit the configuration. The server address format is as follows: **tcp://broker.emqx.io:1883**.

3) After the configuration is submitted, the page will refresh automatically. The updated information will be displayed in the table. Click **Finish and Exit(Second blue button)** to exit the configuration. The module will then restart.



After the device is powered on, it will connects to the default server and goes online. During the startup process, the red network configuration LED flashes to indicate the network configuration progress. The LED turns off after the device successfully connects to the server.

Network Configuration LED Status:

Start network configuration	Red LED flashes every 500 ms
Searching for a network and registering	Red LED flashes every 500 ms
Connecting to the server	Red LED flashes every 2 s
Device online after network configuration is complete	Red LED off

2.1.2 Wifi Network Configuration

Note: All the following network configuration operations must be performed while the device indicator LED is flashing. If the LED is not flashing, the configuration process has failed, and the network configuration procedure must be restarted. The following figure shows the LED flashing status during the network configuration process:

The device network configuration must be performed using the Android APP provided by the manufacturer.

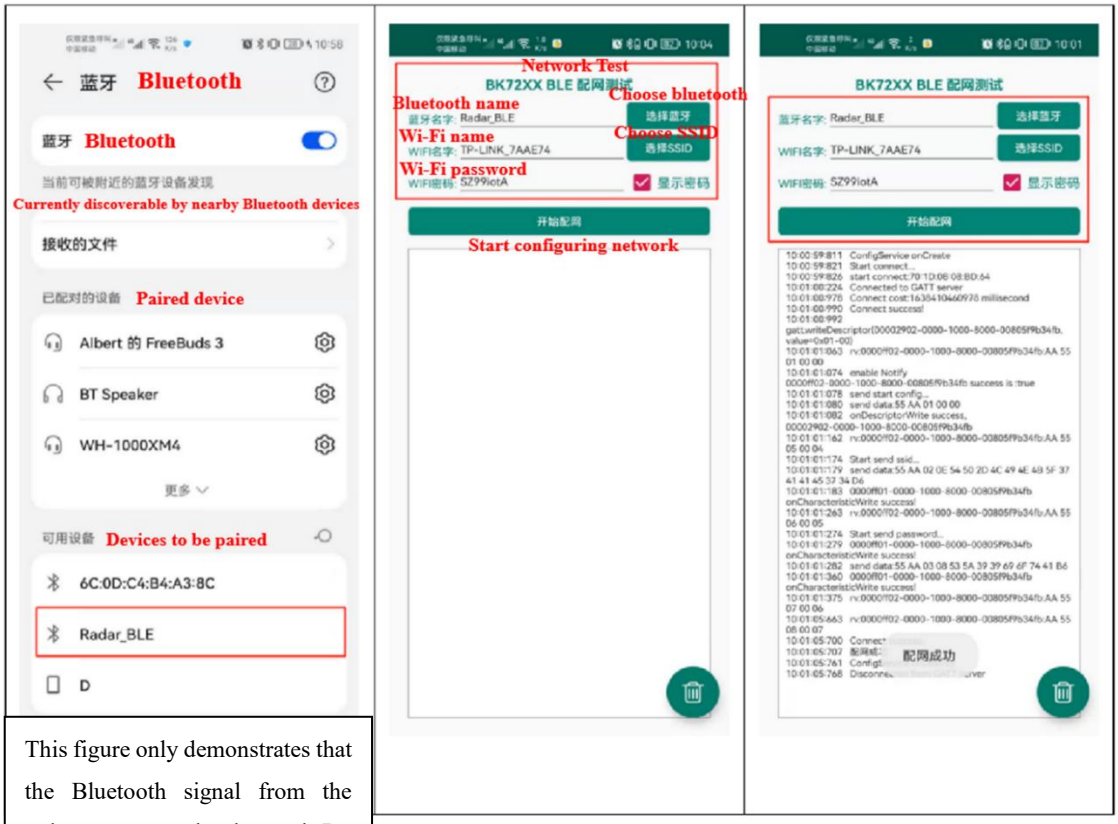
1) Press and hold the Reset button for 5 seconds until the LED indicator turns off, then release the button. The LED will start flashing, indicating that the radar sensor has entered Wi-Fi provisioning mode. At this time, the radar sensor will broadcast a Bluetooth device named "Radar_BLE". Open the App “BK_BLE” and start the network configuration process.

2) Note: The maximum provisioning time is 90 seconds. If the radar sensor is not successfully configured within 90 seconds after entering provisioning mode, a provisioning timeout command will be sent to the App.

3) Open the network provisioning App“BK_BLE”, select the Bluetooth device and Wi-Fi network (SSID), then enter the Wi-Fi password. Please use a 2.4 GHz Wi-Fi network, as 5 GHz Wi-Fi is not supported.

4) Click "Start Configuring network"

For detailed operating steps, please refer to the figure below.



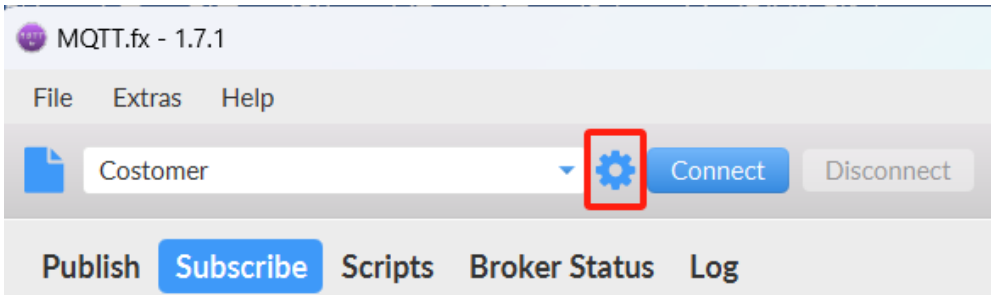
This figure only demonstrates that the Bluetooth signal from the radar sensor can be detected. Do not click any buttons on Bluetooth page.

2.1.3 Connect to the Default Server and Subscribe to Device Topics Using a Third-Party MQTT Client

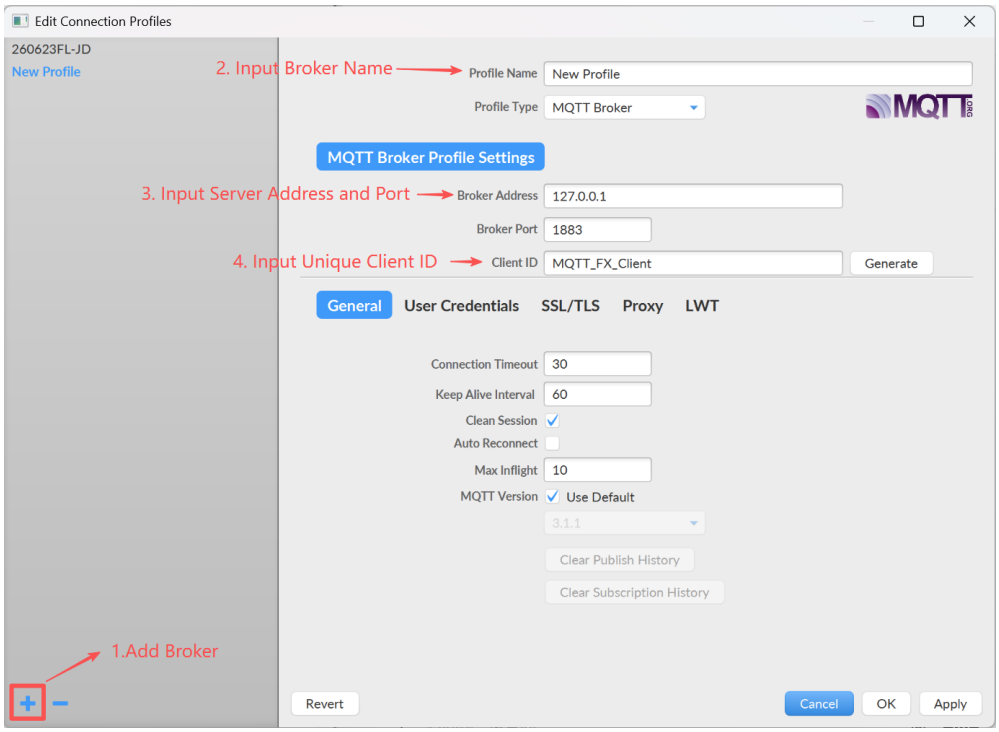
Note: The following operations assume that the device has successfully connected to the public server. After the connection is established, the **Network Configuration LED** should be **off**. If the Network Configuration LED still indicates any network configuration status, troubleshoot the issue according to the network configuration procedure and LED indications, then perform the network configuration again until the device successfully connects to the public server.

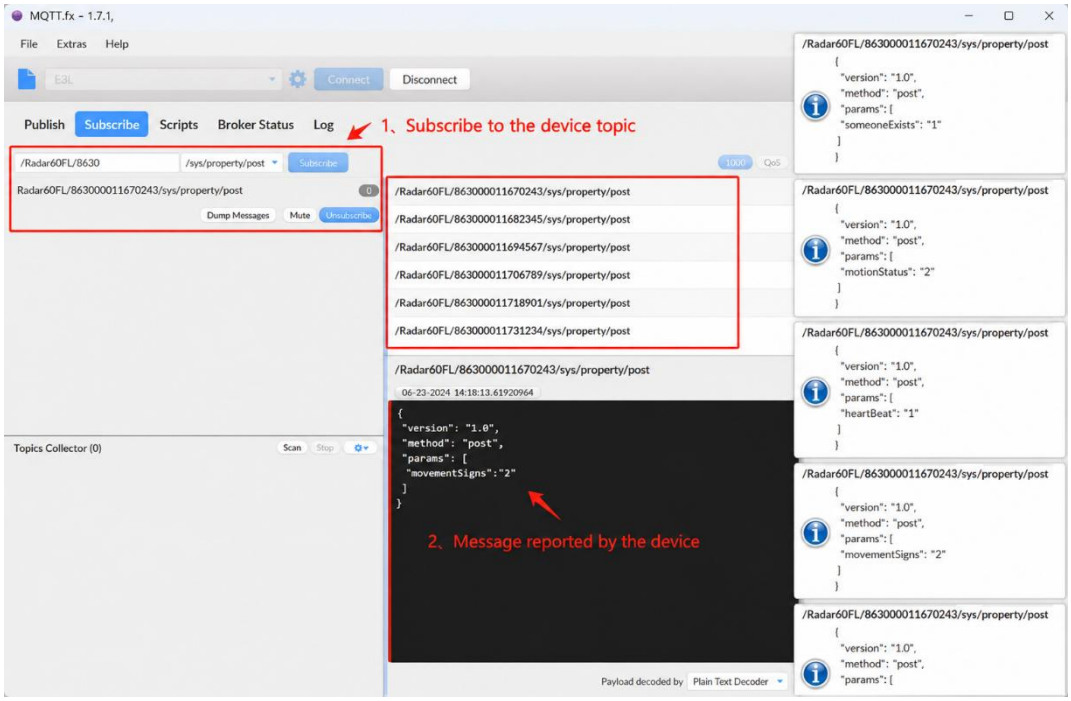
Open MQTT.fx, add the default server information, and subscribe to the device topics by following the steps shown below.

1)



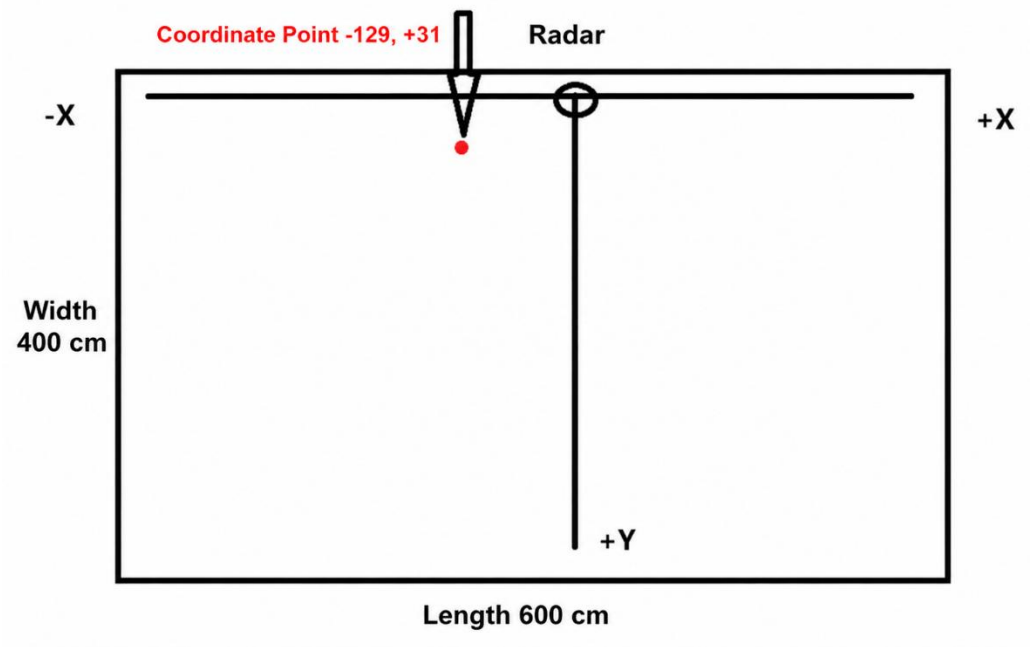
2)



3) 

2.2 Manual Configuration of Detection Range Parameters

1) With the device facing forward, the example device coordinate system is shown below:



2) Coordinate Description：

For example, the coordinate point (-129 cm, +31 cm) is represented as 8081,001F.

- X Coordinate: 8081 consists of two hexadecimal bytes: 0x80 and 0x81.

The most significant bit of byte 0x80 is set to 1, indicating that the X coordinate is **negative**. Perform 0x80 & 0x7F to remove the sign bit, resulting in 0x00.

Convert the X coordinate to a decimal value using the following calculation:

0x00 × 256 + (0x81 & 0xFF) = 129 cm

After removing the sign bit, the distance value is 129 cm. Since the sign bit is set to 1, the final X-coordinate is -129 cm.

- Y Coordinate: The Y coordinate does not support negative values. Bytes 0x00 0x1F are converted to a decimal value in the same way:
  0x00 × 256 + (0x1F & 0xFF) = 31 cm

Therefore, the first coordinate point is (-129 cm, +31 cm). The remaining coordinate points can be calculated using the same method.

3) Manual Detection Range Configuration

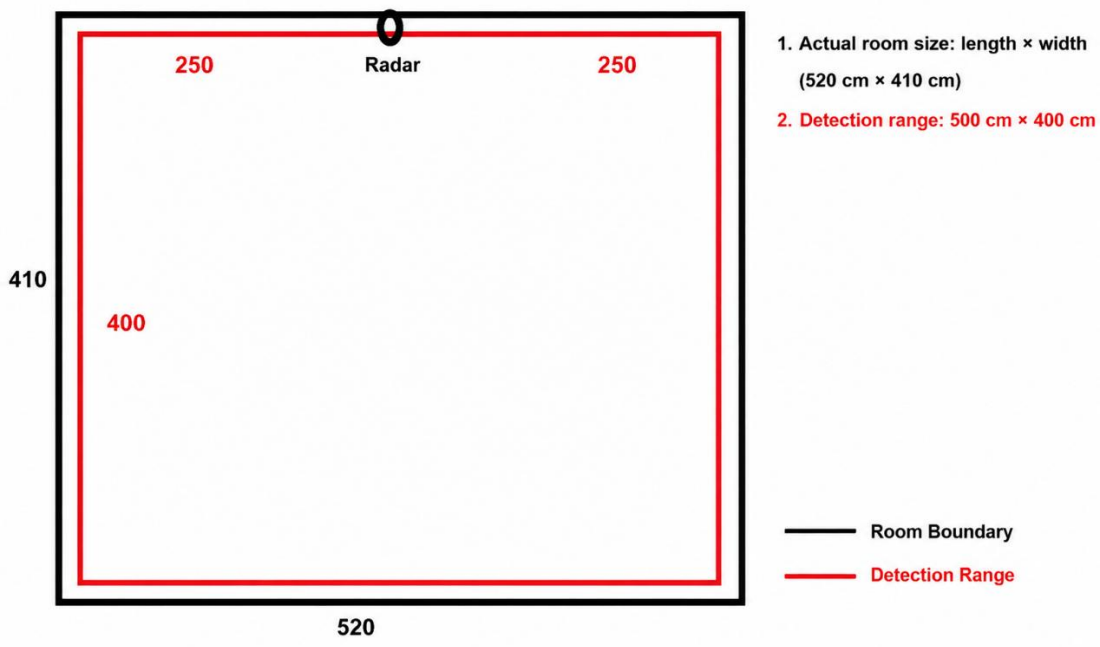
When configuring the detection range manually, the distances from the radar to the detection boundaries along all four coordinate axes must be specified. The negative Y-axis (-Y) is fixed at 0 cm by default (as the device is wall-mounted)；

Recommended setting ranges for each axis are as follows:

- Negative X-axis (-X): 100 cm ≤ -X ≤ 250 cm
- Positive X-axis (+X): 100 cm ≤ X ≤ 250 cm
- Positive Y-axis (+Y): 150 cm ≤ Y ≤ 400 cm

Configuration Example:

Assume the actual room dimensions are 520 cm × 410 cm (L × W), and the device is installed at the center. When configuring the detection range for each axis, a 10 cm clearance should be maintained between the detection boundary and the wall to avoid interference. Based on the room dimensions and the installation position, the required detection range parameters for each axis can then be determined.



The parameter values to be sent for the manual detection range configuration are shown in the figure below. (For more information, refer to the *People Counting Radar MQTT General Protocol Specification V1.8*.)

Manually Set the Detection Range (radarRange)

Active reporting is not supported. The data range is: [1 byte, 2 bytes (positive half-axis), 2 bytes (negative half-axis), 2 bytes (positive half-axis), 2 bytes (negative half-axis)]

This property supports setting. The format is as follows:

```
{
    "version": "1.0",
    "method": "set",
    "params": {
        "radarRange": [0, 0, 250, 128, 250, 1, 144, 0, 0]
    }
}
```

The response format is as follows:

```
{
    "version": "1.0",
    "opt": "set",
    "res": "success",
    "params": {
        "radarRange":  [0, 0, 250, 128, 250, 1, 144, 0, 0]
    }
}
```

2.2.1 Door Label

Using radar as the origin, obtain the center coordinates of the **door label** area and its width and height (or radius). Calculate the coordinates of each vertex of the rectangle based on the room dimensions. When entering the rectangle coordinates, the vertices must be entered sequentially in either **clockwise** or **counterclockwise** order.

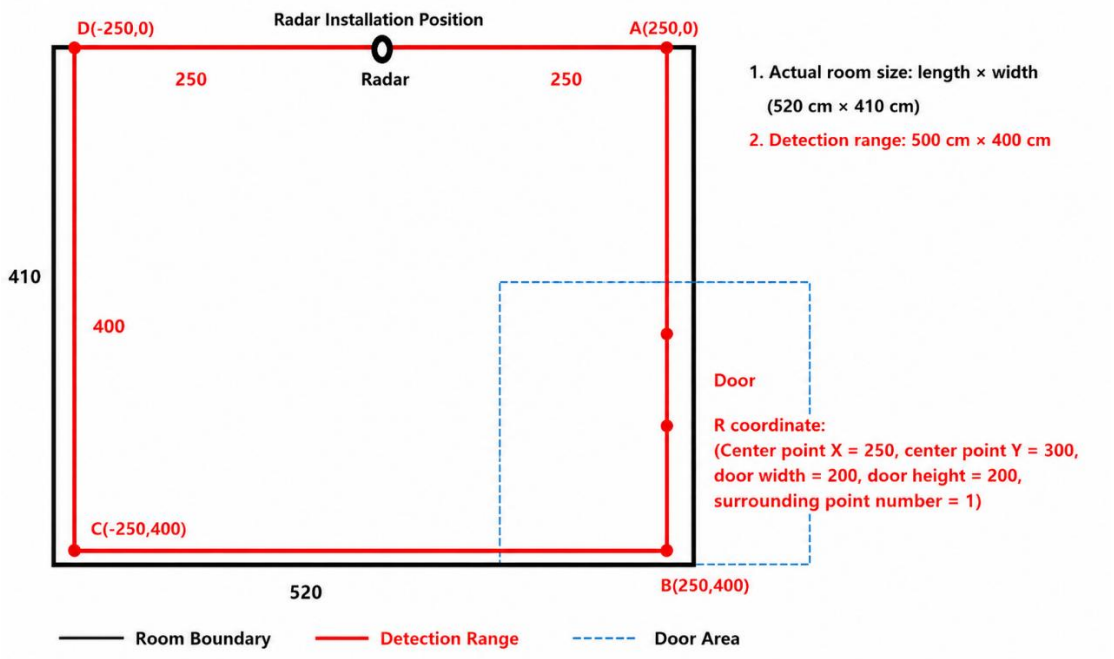
Two door label area types are supported: Rectangle and Circle.

0: Circle, 1: Rectangle.

When the door label area type is Circle, X represents the circle radius, and Y is not used (set to 0).

When the door label area type is Rectangle, X and Y represent the width and height of the rectangle, respectively.

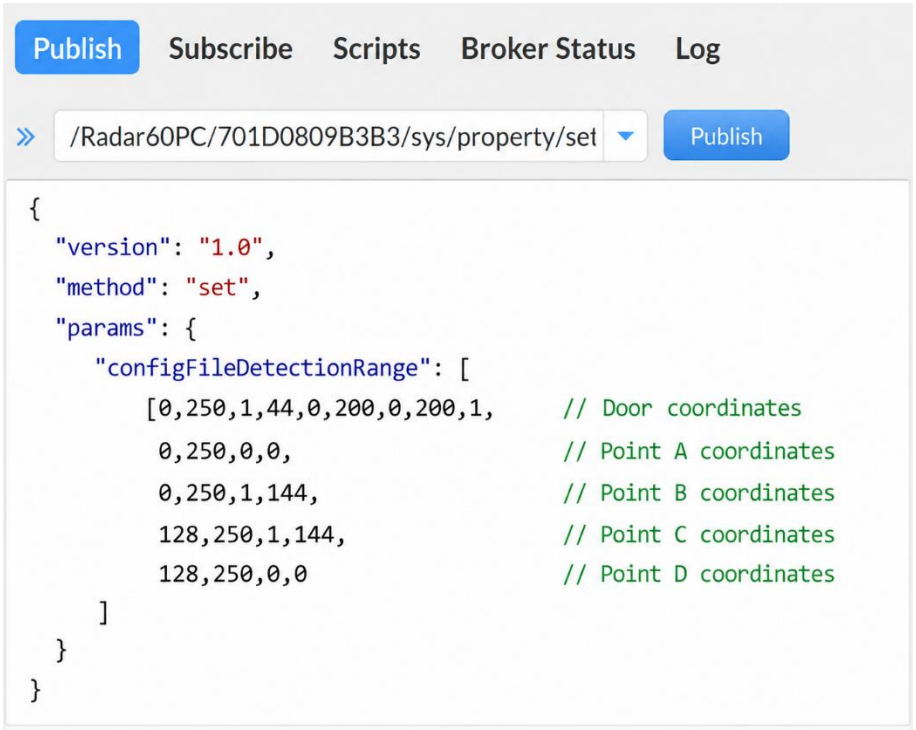
Example:



As shown in the figure above, obtain the door label area parameters and the detection range coordinates. Select the range type as Rectangle. According to the detection range attribute configuration rules in the configuration file, the parameter format is as follows:

2B X + 2B Y (label area center coordinates) + 2B X + 2B Y (label area width and height) + 1B (range type) + [n × (2B X-axis + 2B Y-axis)]

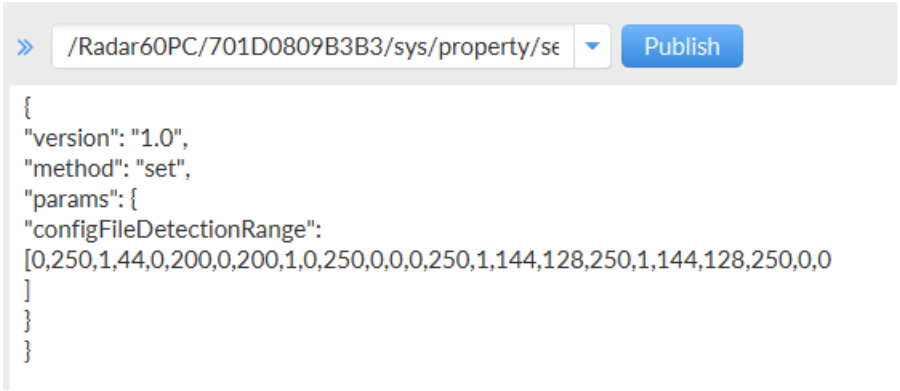
The MQTT command format is shown in the figure below:



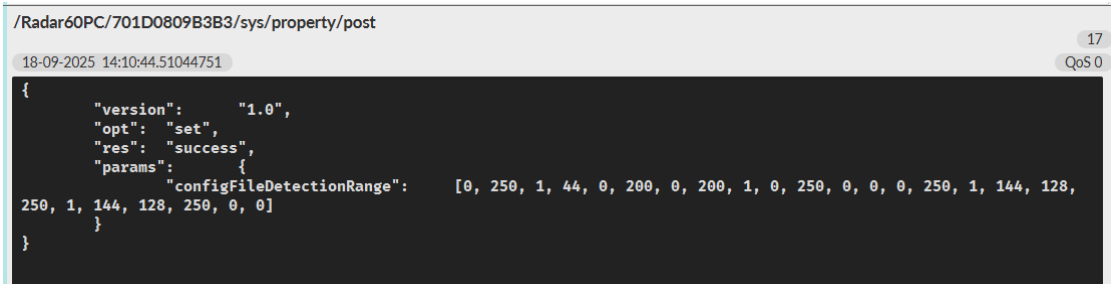
Configure the MQTT command data shown in the figure above as follows:

{
"version": "1.0",
"method": "set",
"params": {
"configFileDetectionRange":
[0,250,1,44,0,200,0,200,1,0,250,0,0,0,250,1,144,128,250,1,144,128,250,0,0
]
}
}

- Configuration Command Example:



- Configuration Successful Display:



2.3 Test Procedure

After the installation and configuration are completed, ensure that all people have left the room. Send the Clear Number of People Information (clearNumberOfPeopleInfor) command to clear the occupancy data.

After the occupancy information has been calibrated, proceed with the test.

3. Revision History

Revision	Release Date	Summary
V1.0	2025/09/26	First Release