nRF52x Beacon

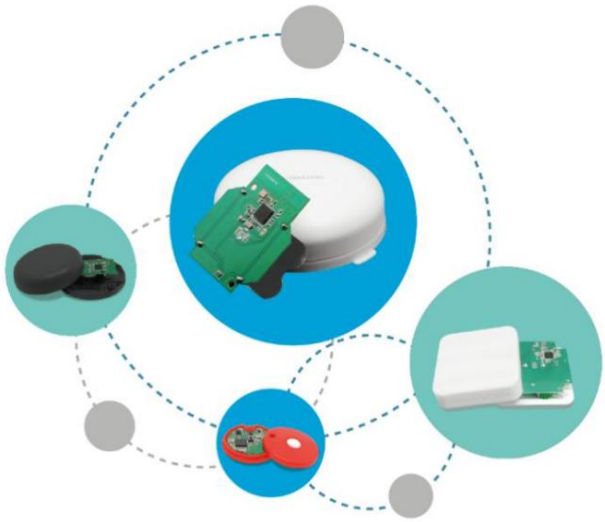

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Table of contents

1. Product Introduction..... 1

1.1 Introduction.....1

1.2 Application scenarios.....1

1.3 Technical Parameters.....2

2.Module Introduction..... 3

2.1 Module Pinout.....3

2.2 Module Dimensions.....5

3. How to use beacon..... 5

3.1 Operating Instructions.....5

3.2 Beacon Interface Description.....6

3.3 Beacon LED and Button Description..... 7

4. Beacon data format..... 8

4.1 Broadcast Data Format.....8

4.2 Response Data Format.....8

5. Beacon power consumption..... 9

5.1 nRF52832 Power Consumption.....9

5.2 nRF52810 Power Consumption.....10

6. Upgrade..... 12

7.52810&32 Schematic Diagram..... 17

1. Product Introduction

1.1 Introduction

nRF52x beacon can use two SoCs, nRF52832 and nRF52810. nRF52x beacon is a portable

iBeacon tags feature the ultra-low power chipset NRF52x and BLE 5.0 technology. nRF52x SoC is a powerful,

Highly flexible ultra-low power multi-protocol SoC, ideal for Bluetooth® low energy, ANT and 2.4GHz ultra-low power wireless

nRF52x SoC is built with a 32-bit ARM® Cortex™-M4F CPU with 512kB +64kB

RAM (nRF52832) and 192kB+32kB RAM (nRF52810). Our beacons have multiple series, including mini series

The nRF52x-B1/3 series, waterproof B2, card series C series and ultra-long standby X series.

1.2 Application Scenarios

ÿ Indoor positioning

ÿ Parking management

ÿ Temperature and humidity monitoring

ÿ Crowd flow analysis

ÿ Light detection

ÿ Asset Management

ÿ 2.4GHz Bluetooth low energy system

ÿ Home and building automation

ÿ Sports and leisure equipment

ÿ Consumer electronics

ÿ Human-machine interface device

ÿ Health and medical care

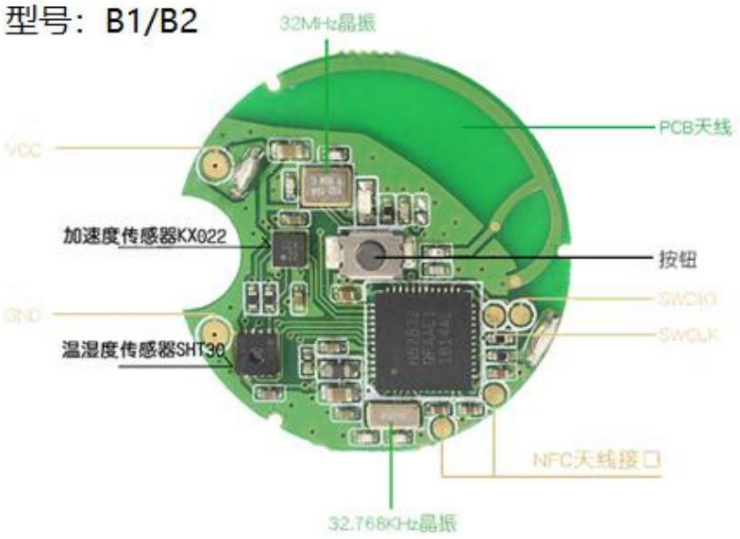
1.3 Technical parameters

Technical indicators	nRF52832	nRF52810
Operating Voltage	1.7 - 3.6v	1.7 - 3.6v
working frequency	2402-2480MHz	2402-2480MHz
Number of channels	40	40
Modulation	GFSK	GFSK
Output Power	-40dBm - +4dBm	-20dBm - +4dBm
Transmitting current (0dBm)	6.5mA	6mA
Receiving sensitivity	-97dBm	-96dBm
Receiving current	5.4mA	4.6mA
stand-by current	2.5uA	1.9uA
Transmission rate	1Mbps	1Mbps
Chip Flash	512KB	192KB
Chip RAM	64KB	24KB
Over the air updates	yes	yes
Antenna type	PCB Antenna	PCB Antenna
Communication distance	>50m	>50m
Operating temperature	-20-75ÿ	-20–75ÿ

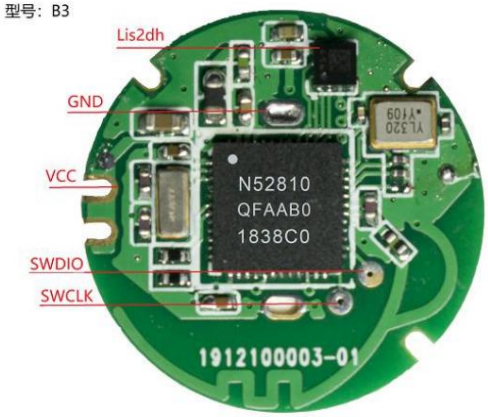
2. Module Introduction

2.1 Module Pinout

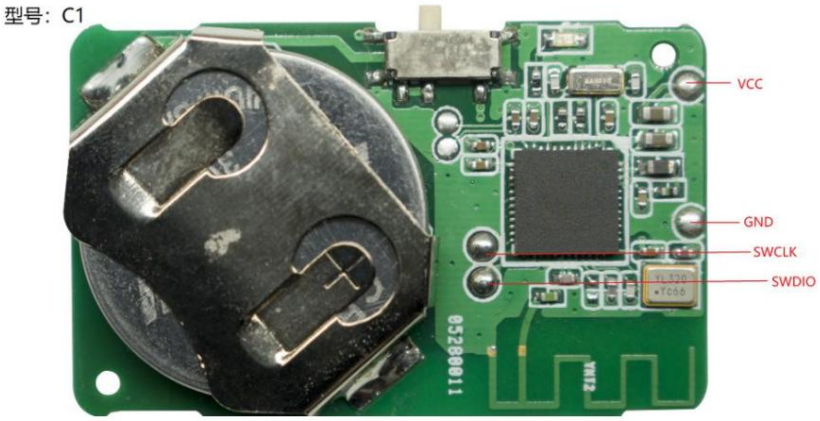
型号：B1/B2



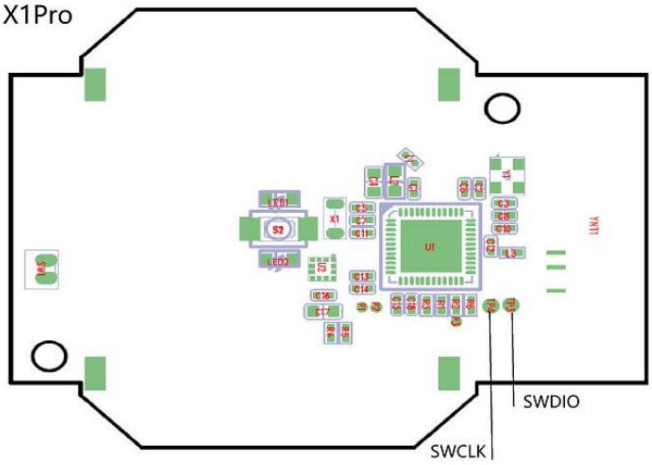
型号：B3

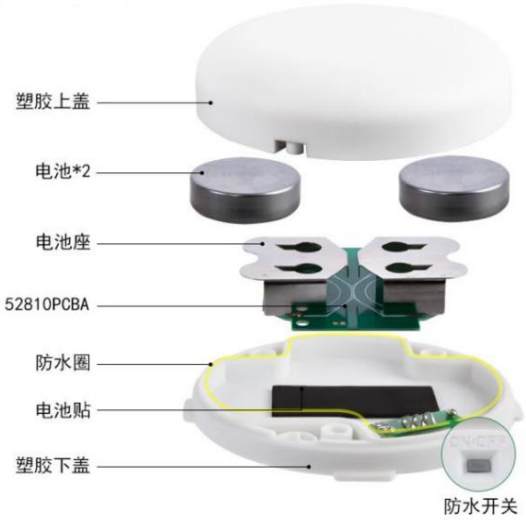


型号：C1

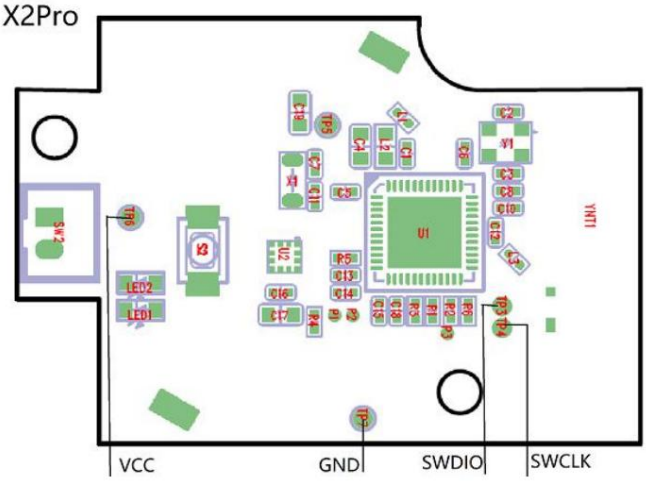


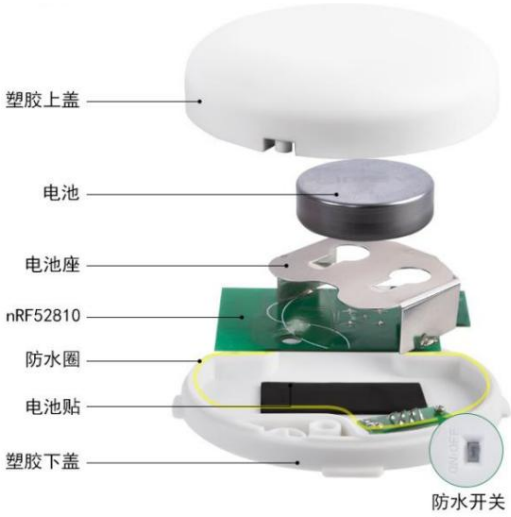
型号：X1Pro



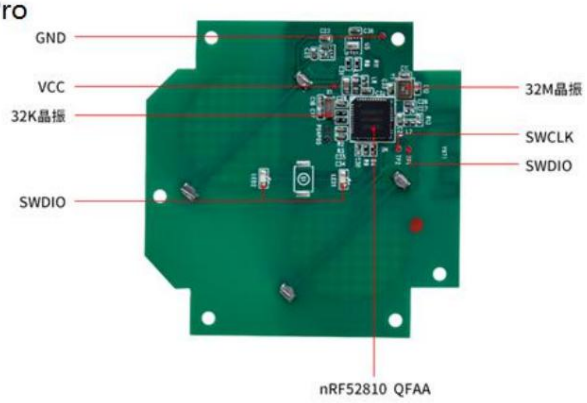


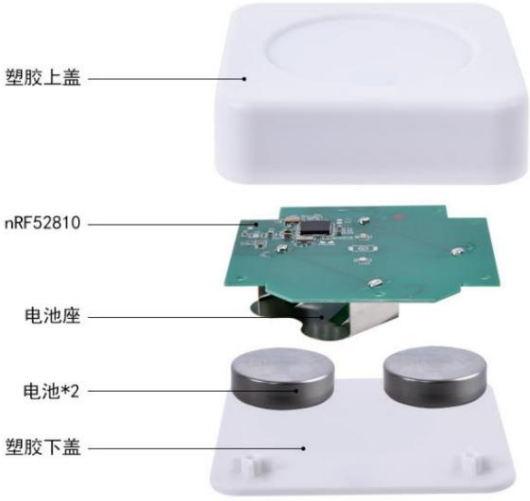
型号：X2Pro





型号：X4Pro





2.2 Module size

	B1/B2	B3	C1	X1Pro	X2Pro	X4Pro
Model size with housing (mm)	30*10	23*8	42.93*26.52*6.98	70*23	60.1*17.9	57.4*57.4*16.0

3. How to use beacon

3.1 Operation Instructions

Beacon can be used directly after powering on. If you need to modify parameters, please download the RLBeacon tool on the App Store. Required for connection, the default password is 123456.

Device List Device Information **Password Input**

3.2 Beacon API Description

Service UUIDÿ00001803-494c-4f47-4943-544543480000

Description	UUID	Attribute	Length
mobile->ibeacon	00001805-494c-4f47-4943-544543480000	write	20(Max)
ibeacon->mobil It is	00001804-494c-4f47-4943-544543480000	notify	20(Max)

Notm	APP Command	Return	Description
1	Modify the name: 0x11+name(length<=8)	0x11	Maximum 10 bytes
2	Modify UUID: 0x12+16byte UUID	0x12+16byte UUID	A total of 16 bytes UUID
3 Read UUID: 0x13		0x13+16byte UUID	
4	Modify Major,Minor battPowerÿ 0x14+Major+Minor+BattPower	0x14+Major+Minor +BattPower	majorÿ2byte Minorÿ2byte BattPowerÿ1byte
5	Read Major,Minor,BattPowe: 0x15	0x15+Major+Minor +BattPower	
6	Modify the broadcast interval: 0x16+adv(1byte)	0x16+1byte	The broadcast interval is in ms. The actual broadcast interval is 40*adv(ms)
7	To modify the transmit power: 0x17+power(1byte)	0x17+1yte	Power(1-9 default:7) Please refer to the following table for details
8	Change password 0x18+passcodeÿ6byteÿ	0x18+passcodeÿ6byteÿ	Passcode: must be 6 bytes
9	Modify Mac: 0x1B +mac(6 byte)	0x1B +mac(6 byte)	

APP Modify Transmit Power

	nRF52832	nRF52810
1	-40dBm	-20dBm
2	-20dBm	-16dBm
3	-16dBm	-12dBm
4	-12dBm	-8dBm
5	-8dBm	-4dBm
6	-4dBm	0dBm
7	0dBm	3dBm
8	3dBm	4Bm
9	4Bm	

3.3 Beacon LED and button description

(1) When the beacon is powered on, the LED will flash 3 times.

(2) In the power-on state, press and hold the button for 3 seconds, the LED light flashes once, and the beacon turns off; in the power-off state, press and hold the button for 3 seconds, the LED light flashes 3 times, and the beacon turns off.

Power on

4. Beacon data format

4.1 Broadcast Data Format

Position 0		1	2	3	4	5	6	7	8	9-24 25-26 27-28 29			
Data 0x02	0x01 0x06	0x1A 0xFF	0x4C 0x00	0x02 0x15	uuid major minor								rssi at 1 m

4.2 Response Data Format

Location	0	1	2-long h	length +1	length +2	length +3	length +4	length+5 . length+8	length+9 . length+20
data	Name length length	0x09 Name 0x13			0x16	0x18	0x03 Temperature, humidity and acceleration data		

Location	0	1	2 - length	length+1 length+2 length+3 length+4			length+5 . length+10	length+11 . length+12
data	Name length length	0x09 Name 0x11			0x16	0x03	0x18	mac address major

Location	length+13 . length+14	Length +15	length+16 . length+17	length +18
Data minor		Transmitting power Rate	Broadcast Interval	battery power

Remark:

1. The scan response packet has two parts of data: the first part is the name and sensor data; the second part is the basic information of the beacon, including mac, major, These two parts of information are broadcast in turn.

2. If the beacon does not have a sensor, the scan response packet will only contain a portion of the data.

3. If the beacon has only one sensor, the scan response packet contains only the data of the corresponding sensor, and the data of other sensors is 0. 4.

Temperature and humidity data: temperature integer (1 byte) + temperature decimal (1 byte) + humidity integer (1 byte) + humidity decimal (1 byte)

5. Three-axis data: three-axis (x/y/z) sign bit (1 for negative number, 0 for integer 1byte), three-axis (x/y/z) integer bit (1byte), three-axis (x/y/z) The first decimal place (1 byte), the second decimal place (1 byte) of the three axes (x/y/z)

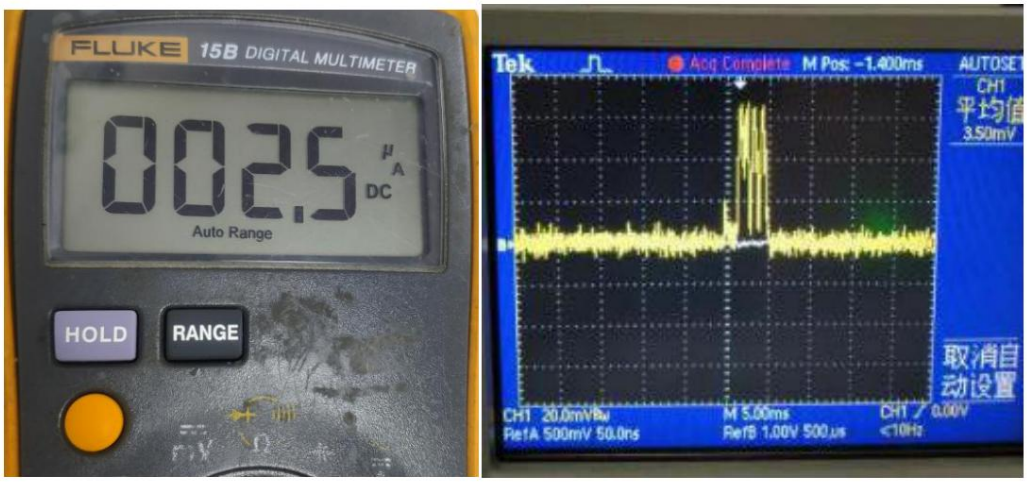
5. Beacon power consumption

Broadcast current test method: When the beacon is broadcasting, connect a 10 ohm resistor in series and connect an oscilloscope to both ends of the resistor to measure the pressure.

Static current test method: Connect the beacon in series with a multimeter to check the current.

5.1 nRF52832 Power Consumption

Power consumption without sensor:



Power

consumption: Static current:

2.5uA Broadcast current: 6.5mA

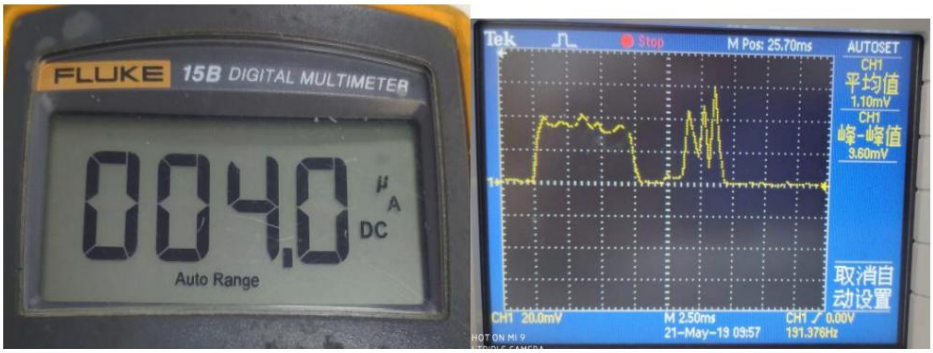
Broadcast time: 5ms

Broadcast interval: 1000ms

Average current = $\frac{\text{ÿniwahmawÿaÿiÿwÿawhamÿa}}{\text{ÿ ÿ as}} = 0.0349875\text{mA}$

Using 2032 battery life = $\frac{\text{ÿ}}{\text{As}}$ ÿÿÿÿ

Two sensors working simultaneously:



Power

consumption: Static current:

4.0uA Broadcast current: 6.5mA

Broadcast time: 5ms

Broadcast interval: 1000ms

Sensor operating current: 4mA Sensor

operating time: 7.5ms Timer operating

current: 1mA Timer operating time:

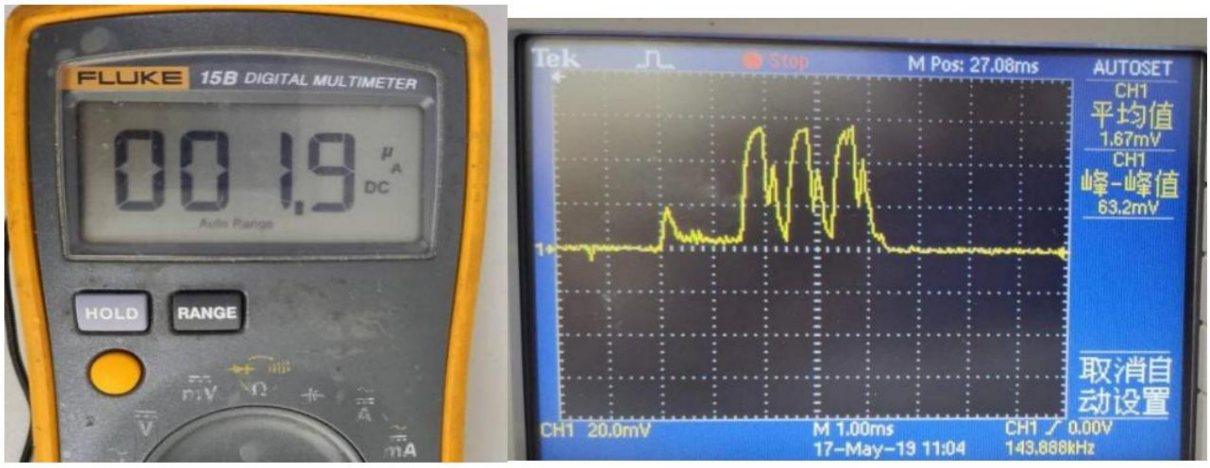
2.5ms

Average current = ÿ ÿ ÿ ÿÿ ÿ ÿ ÿ ÿ ÿ ÿ ÿÿ ÿ ÿ ÿ ÿ ÿ / ÿÿÿÿÿ = ÿÿÿ

Using 2032 battery life = ÿÿÿÿÿ / ÿÿ = ÿÿ

5.2 nRF52810 Power Consumption

Power consumption without sensor:



Power

consumption: Static

current: 1.9uA Broadcast

current: 6mA Broadcast

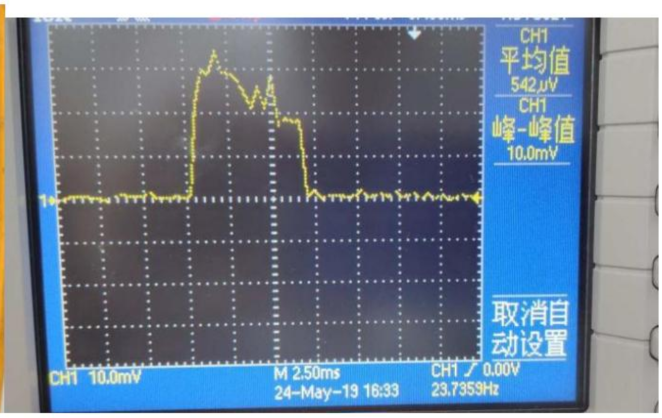
time: 5ms Broadcast interval: 1000ms

Average current = ÿÿuActualSizesÿÿmActualSizes mAÿÿÿÿÿÿÿ

msssssssssssssss

Use time of 2032 = mA/mA mAssssssssssss ÿÿ

Two sensors working simultaneously:



Power

consumption: Static

current: 2.8uA Broadcast

current: 6mA Broadcast time: 5ms

Broadcast interval: 1000ms

Sensor operating current: 3mA

Sensor working time: 7.5ms

Timer operating current: 1mA Timer

working time: 2.5ms

Average current = ÿÿÿ -

ÿ ÿ as

Using 2032 battery life = ÿ ÿÿ

-

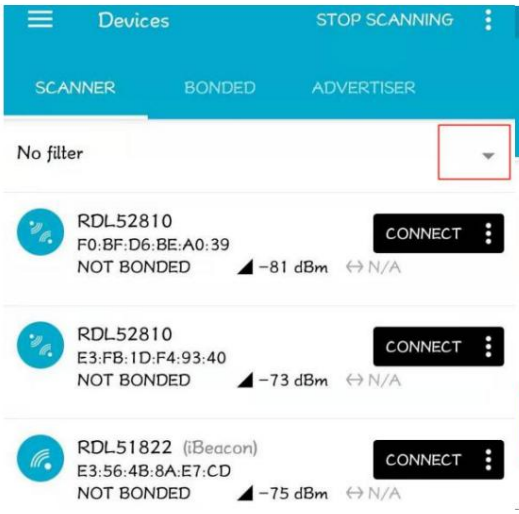
6. Upgrade

nRF5x supports over-the-air upgrades. When the beacon encounters an error, you can restore the default settings or Update the firmware (provided that the beacon can still broadcast). Upgrade requires an upgrade package (please ask customer service and specify which one beacon) and upgrade software (our APP does not have an integrated upgrade function, so use Nordic's official software to upgrade class).

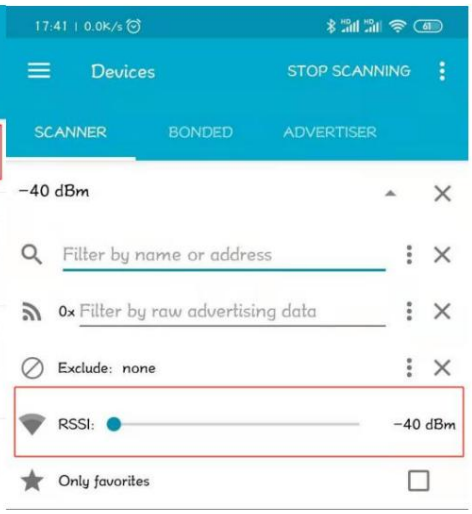
6.1 Please download the upgrade software: nrf connect, which is supported by both Android and iOS systems. This tutorial uses the Android system For tutorial.

6.2 Open nrf connect, click the position marked in Figure 6.2-1 and set RSSI as shown in Figure 6.2-2.

Click the location marked in 6.2-1 to collapse the settings.



6.2- 1

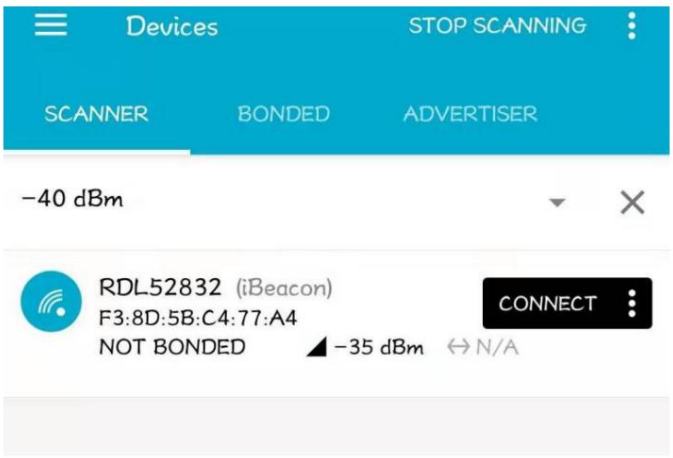


6.2- 2

6.3 Place the beacon close to the phone and other beacons away from the phone (too many beacons next to the phone are prone to interference).

At the same time, click SCAN in the upper right corner of the APP to start searching for beacons. If no beacons can be found, you can appropriately

In one step, set the RSSI to -50 or -60 so that the phone can only search for one beacon.

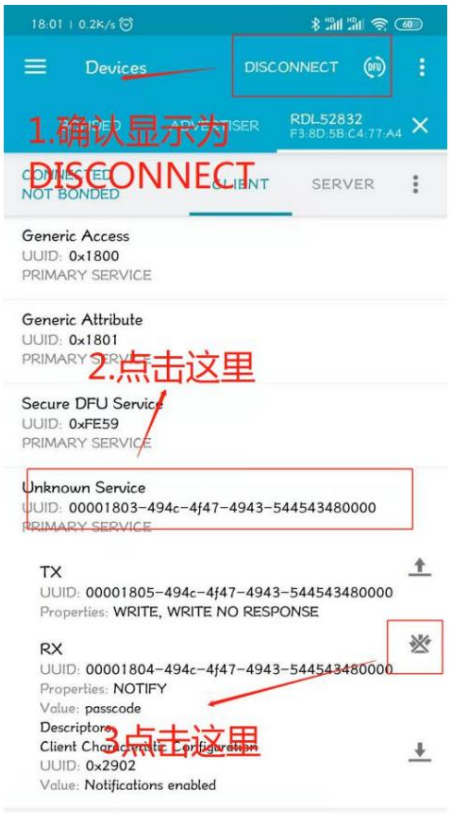


6.3- 1

6.4 Click CONNECT to connect to the beacon. After connecting to the beacon, you need to enter the password quickly, otherwise it will time out.

Automatically disconnect. When the upper right corner shows DISCONNECT, the connection is successful.

CONNECT is disconnected.



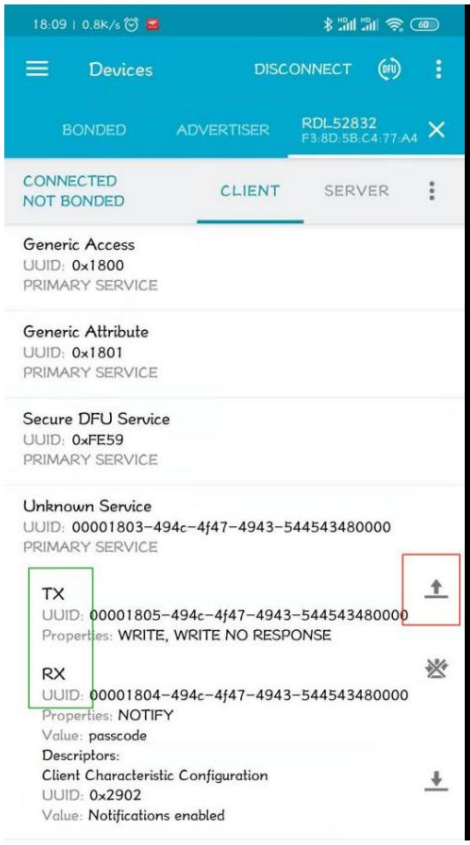
6.4- 1

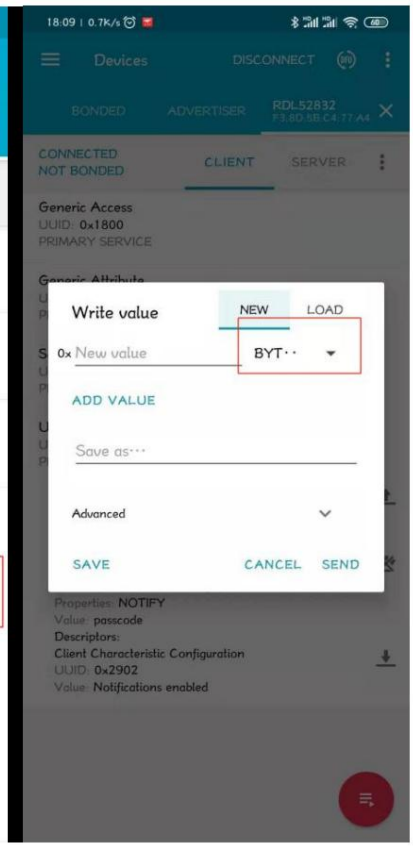
6.5 The green part TXRX in Figure 6.5-1 will be displayed only after setting, otherwise it will be displayed as Unknown Service, so this

It does not matter if the parts are different. Click the red part in Figure 6.5-1, and the password input box will pop up. Click the position marked in 6.5-2

Then enter the password in the horizontal line on the left and click SEND in the lower right corner of the pop-up box.

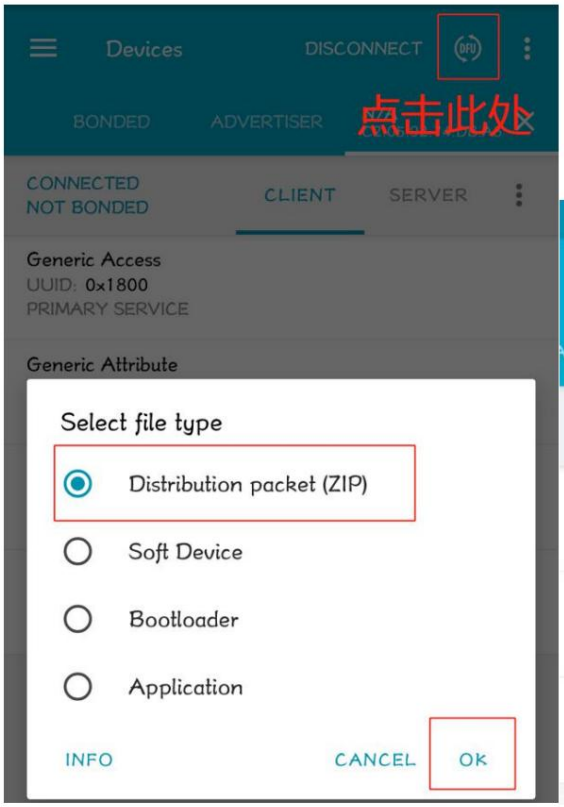
deliver.

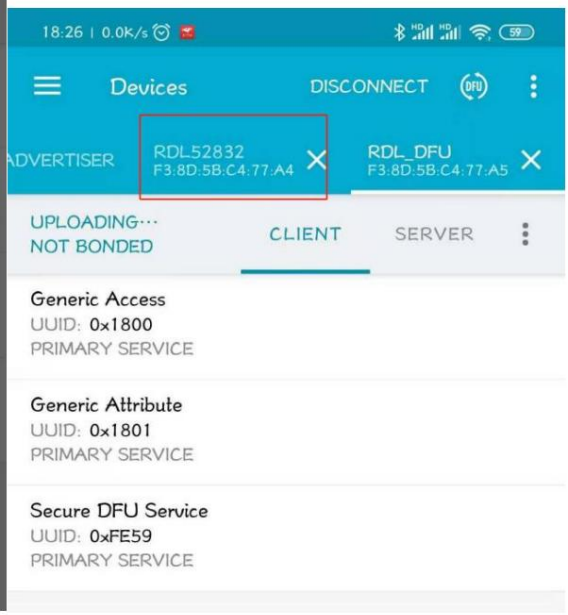




6.5- 1 6.5- 2

6.6 After entering the password, the most important thing is to upgrade. Click the location in Figure 6.6-1 and select Distribution package(ZIP), then click OK and select the upgrade package in the file manager. The APP will automatically enter the upgrade page. As shown in Figure 6.6- 2. If you need to check the upgrade progress, click 6.6- 2, where the original name of the beacon will be displayed.



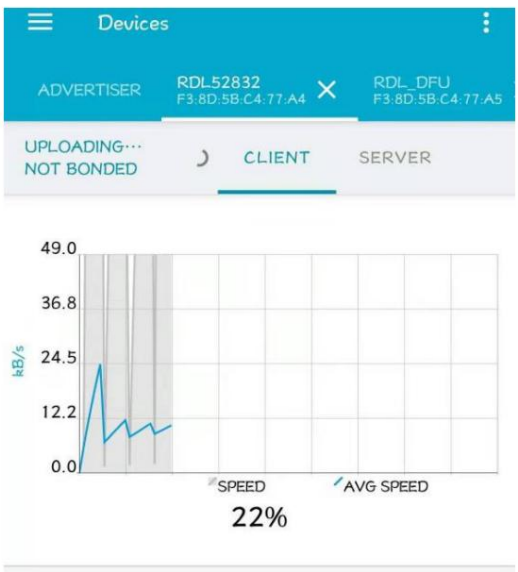


6.6- 1 6.6- 2

6.7 When the upgrade progress reaches 100% and then displays disconnect, it means the upgrade is successful and you can disconnect the beacon directly.

Do not disconnect the beacon during the upgrade process, or the beacon is powered off. If there is no upgrade progress, it may be

The wrong upgrade package was selected. Please try the upgrade again.



6.7

7.52810&32 Schematic