# KBeaconPro App Instruction

## Revision History

| Version | Date | Change Description | Author |
|---|---|---|---|
| V1.0 | 2017/11/12 | Initial draft for KBeaconTools | Adam |
| V1.1 | 2018/02/23 | Name updating | Adam |
| V1.2 | 2018/03/08 | Updating iBeacon/Eddystone URL/Eddystone UID/Eddystone TLM configuration | Adam |
| V1.2 | 2018/03/27 | Updating RSSI value setting | Adam |
| V2.0 | 2018/10/02 | App Interface updating | Claire |
| V3.0 | 2019/10/15 | Name updating&App Interface updating | Claire |
| V4.0 | 2021/07/06 | Name updating&App Interface updating | Claire |
| V4.1 | 2021/11/24 | Adding Power off and Reset function | Claire |
| V4.2 | 2022/06/15 | Adding trigger and sensor function | Elaine |
| V4.3 | 2022/11/2 | Adding Power Profiler function | Elaine |

**C O N F I D E N T I A L**

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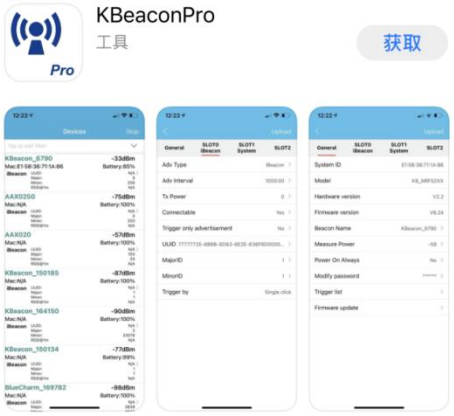
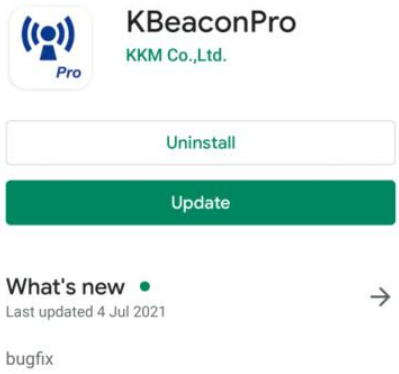
# 1. Download KBeaconPro App

Download the App 'KBeaconPro' from iOS App Store or Android Google Play or scan the QR code below to down the App.




iOS APP

Android APP

**Minimum requirements**

A mobile phone with *Bluetooth* 4.0 support is needed. For Android devices, Android version 5.1 or newer. For iOS devices, iOS version 10.0 or newer.

Reminder: This instruction uses Android App to demonstrate. The iOS App interface is slightly different from Android App.

# 2. How to connect KBeacon device to KBeaconPro App

**Kindly note: Please make sure your KBeacon device is with battery already.**
Enable your smart phone Bluetooth and run the App 'KBeaconPro'.

### 2.1 Turn on KBeacon

- **KBeacon with external or internal button (Including model K1/K11/K21/K23/K3/K4/K41/K4P/K5/K51/K5P/K6/K61/K6P/K7/K71/K8/K81/W59/F1/W3/W52/B1/B2/S1/P2)**

The factory setting of KBeacon with button is OFF.

Turn ON the device: Hold the button for 3 seconds, the LED starts flashing and the flashing lasts for 30 seconds.
Turn OFF the device: Hold the button for 5 seconds, the LED starts flashing and flash 8 times.

- **KBeacon without button (Including model K12/K15/K15A/K15L/W4/U1/K9/K91/K9P/W7/S2/P1)**

The factory setting of KBeacon without button is ON. K12/K15/K9/ P1/W7 does not support turning off the power.

| K1/K11 | K21/K23 | K12 | K3 |
|---|---|---|---|
| | | | |
| K4/K41/K4P | K5/51/K5p | K61/K6P series | K7/K71 |
| | | | |
| K8/K81 | K9/K91/K9P | W4 | W59 |
| | | | |
| U1 | F1 | W51 | W52 |
| | | | |
| W3 | W7 | B1 | B2 |
| | | | |
| S1 | S2 | P1 | W8 |

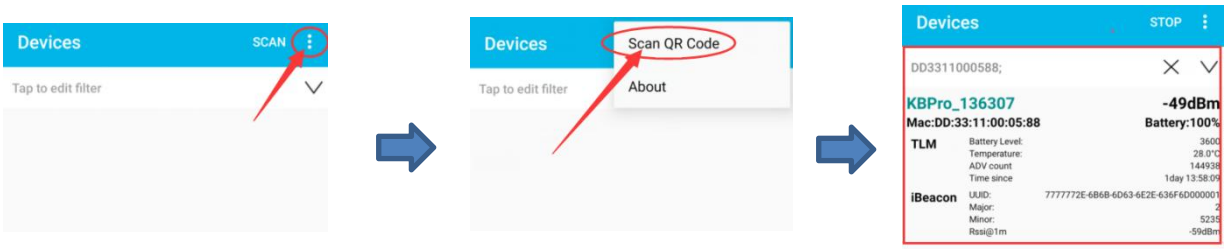
| | | | |
|---|---|---|---|
| | | | |
| K15/K15A/K15L | P2 | | |
| |  | | |

**2.2 Connect KBeacon**

Let's use a K9P (MAC: DD3311000588) to demonstrate, the MAC ID is printed on the device:

- Method 1: Scan QR code to connect

Run KBeaconPro App, Find 'Scan QR code' on the App, and then scan the QR code on the device to find this KBeacon device quickly.

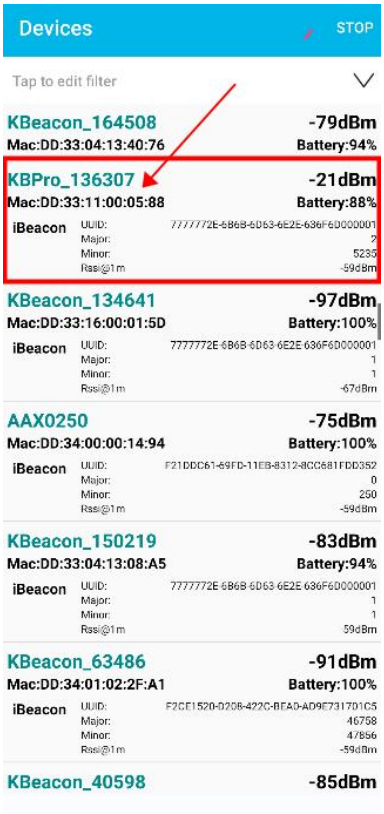


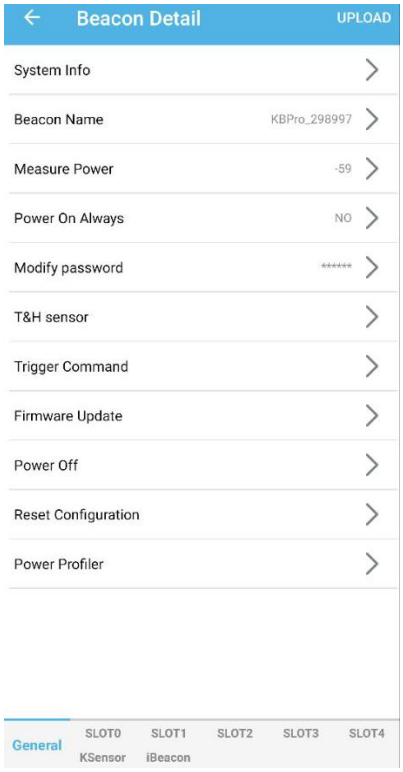

Reminder: iOS App filter the device by Device Name when use the 'Scan QR code' method. If the device name is not KBPro, the device can not be found on iOS App when scan the QR code.

- Method 2: Scan the Bluetooth signal to connect

Run KBeaconPro App and tap 'SCAN' in the top right corner, the App can scan the device's Bluetooth signal, then the Beacon device will be displayed on the scan page.

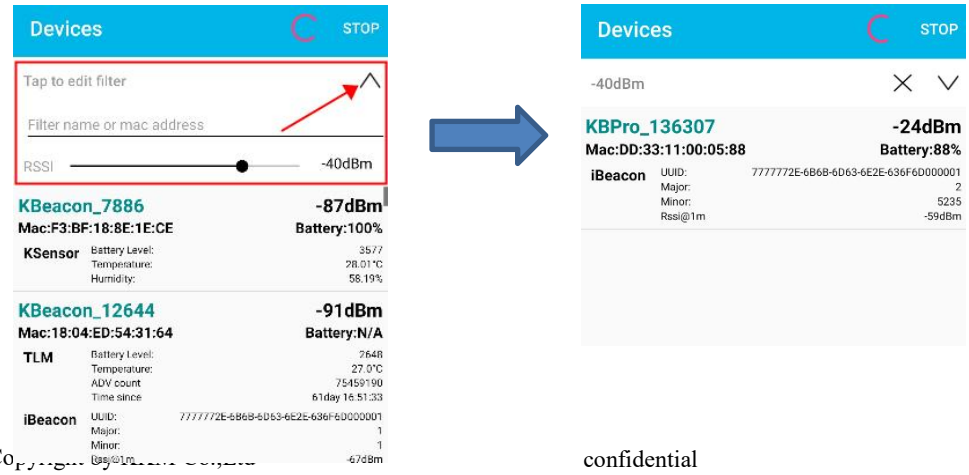
Find the corresponding KBeacon device on the App according to its MAC ID, Tap it, it will start connecting and jump to the configuration page (see pictures below).




**If there are too many devices found , filter by RSSI to find a certain Beacon quickly.**

Put the KBeacon device close to your phone (within 10cm range). Slide the RSSI bar to set the RSSI value at -30~-40dBm, tap the arrow on the top right corner, then the nearest KBeacon can be found.

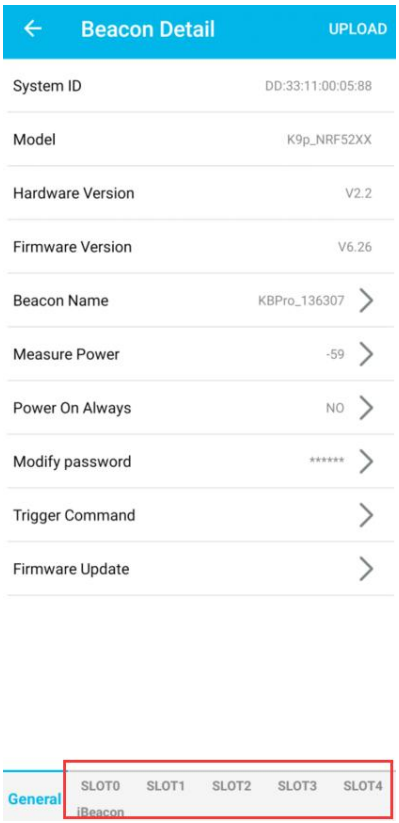


# 3. How to configure KBeacon

## 3.1 SLOT Definition

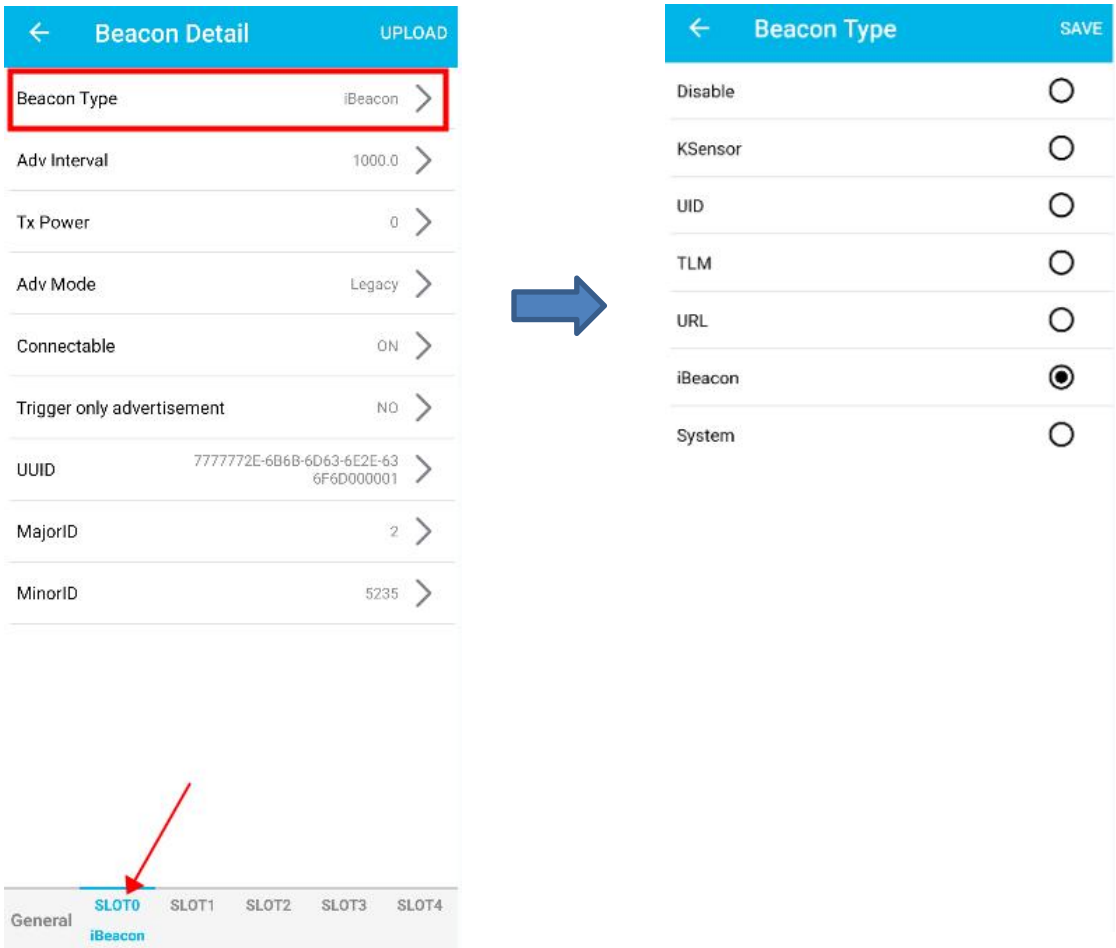
KBeacon supports total 5 SLOTs (SLOT0 to SLOT4). Each SLOT is independent and configurable. The Beacon type can be set for each SLOT. Beacon parameters such as Adv interval, Tx Power, Connectable enable/disable etc can be configured separately for each SLOT. They are independent of each other.

Each SLOT can be set to one Beacon type ONLY. For example, if you set SLOT0 to be iBeacon, set SLOT1 to be URL, set SLOT2 to be TLM, then the KBeacon device will broadcast iBeacon, URL and TLM simultaneously.




KBeacon supports the following Beacon types:

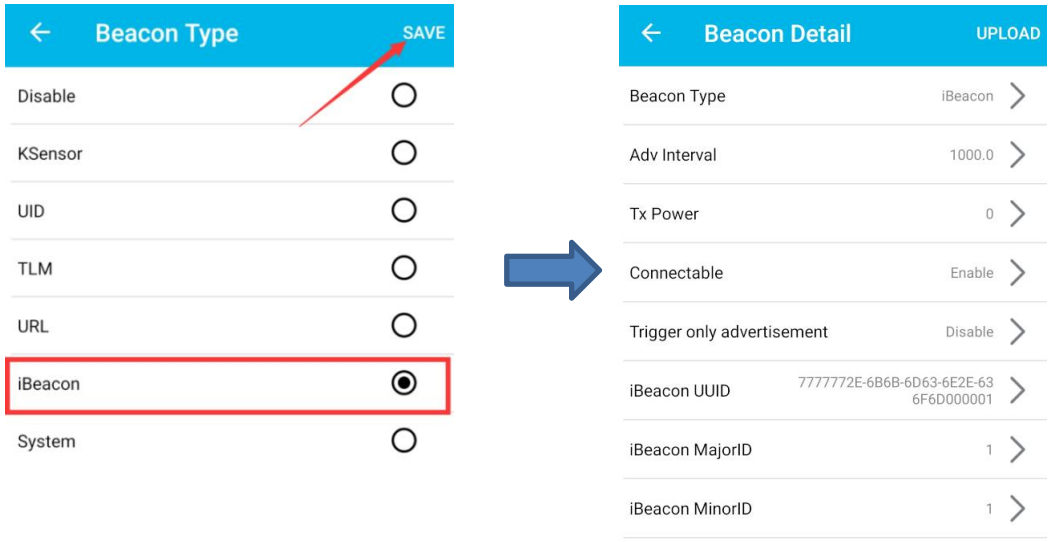
- **iBeacon**
- **Eddystone URL**
- **Eddystone UID**
- **Eddystone TLM**
- **KSensor:** KKM self-defined protocol, includes battery level and sensor information
- **System:** Including the KBeacon device info such as System ID (ie.MAC ID), Model name.




## 3.2 How to configure iBeacon and Eddystone

**(Take iBeacon as an example)**

Tap: Beacon Type—> iBeacon—> Save—> Return



iBeacon parameters (UUID, Major ID, Minor ID, Adv Interval, Tx power etc.) can also be configured in the App.

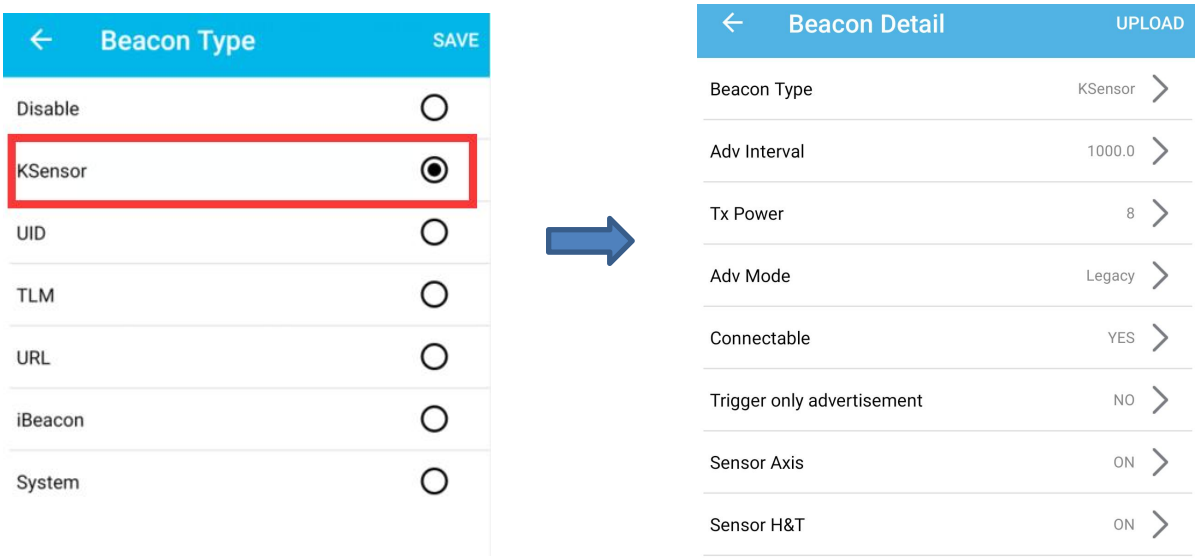
**Eddystone URL, UID, TLM, can be configured by the same steps above.**

Reminder: After the parameters are modified, you need to tap: UPLOAD —> OK, then all the parameters configured can be loaded to the device successfully.

## 3.3 How to configure KSensor and System

KSensor is KKM self-defined protocol, it includes battery level and sensor information (for example temperature&humidity sensor, acceleration sensor etc).

Tap: Beacon Type—> KSensor—> Save—> Return

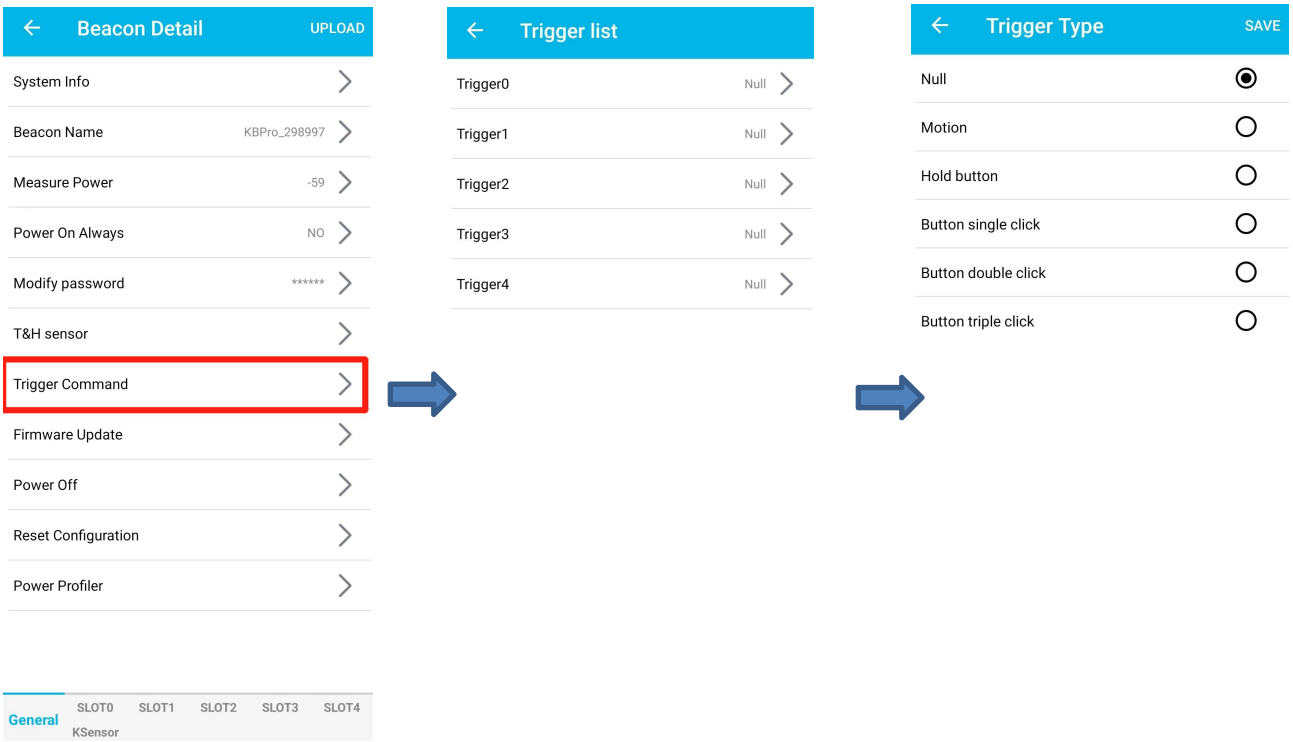



**'System' can also be configured by the same steps above.**

## 3.4 How to configure Trigger Command

Reminder: The Trigger Command function can be configured ONLY when the KBeacon device has a push button or has sensor such as accelerometer, temperature-humidity sensor.

Tap: Trigger Command—>Trigger Type

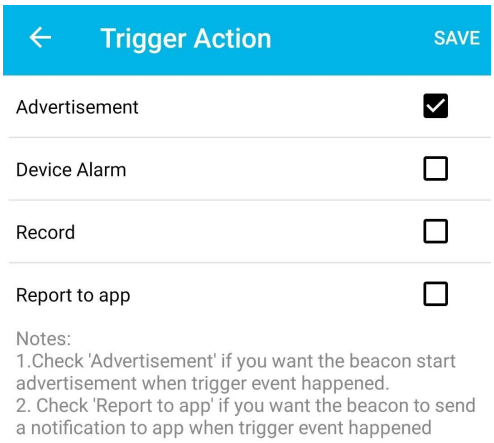



**(Take 'Button single click' as an example)**

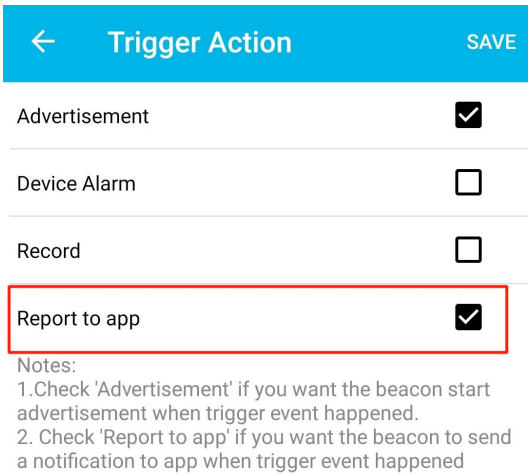
Tap: Button single click—> Save—> Return

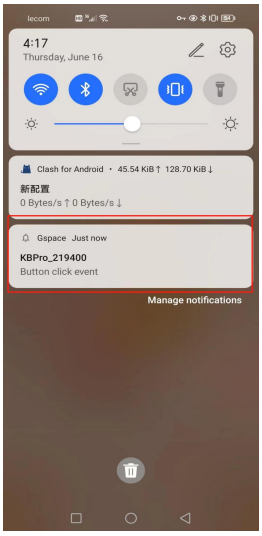
Return to the trigger page, and then you can see the trigger parameters such as Trigger Action, Trigger Adv Slot, Advertisement Change, Trigger Adv Time can be configured.

- **Trigger Action:** What the Beacon device would do when the trigger event happens

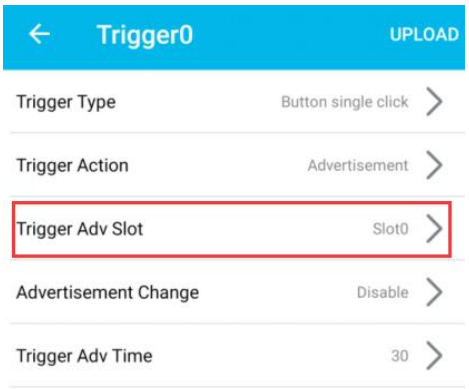


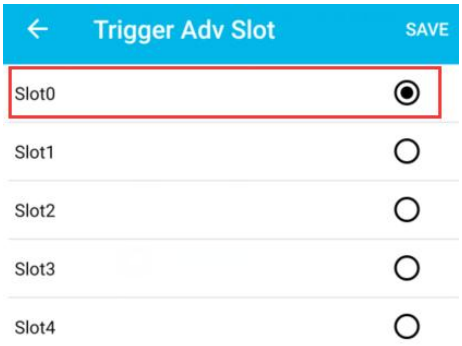

If set "Report to app", there will be a message notification displayed on the cell phone when the trigger event happens.



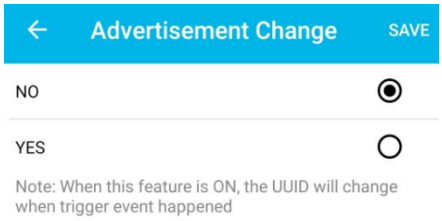




**Trigger Adv Slot:** Which SLOT the Beacon device would broadcast when the trigger event happens. For example, SLOT0 is set to be iBeacon, if 'Trigger Adv Slot' is set to be SLOT0, then when the Beacon button is single clicked, the Beacon will broadcast iBeacon.

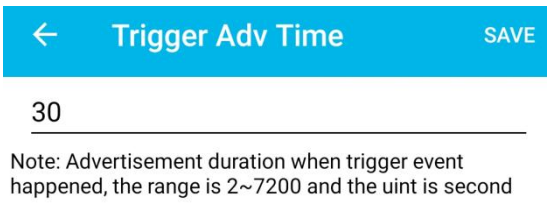


- **Advertisement change:** When this feature in ON, the UUID will change when trigger event happens

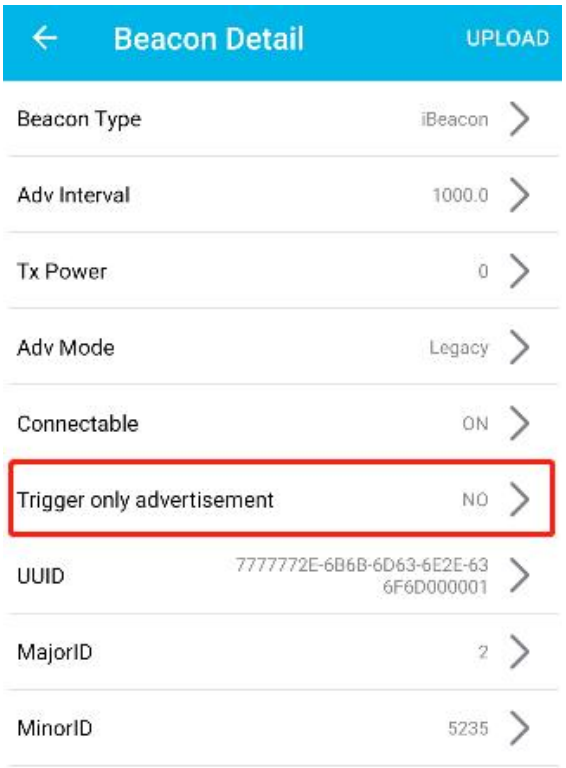



- **Trigger Adv Time:** The Advertisement duration when trigger event happens




- **Trigger only advertisement:** When this feature is set to be 'YES', this slot will be broadcasted only when the trigger happens.

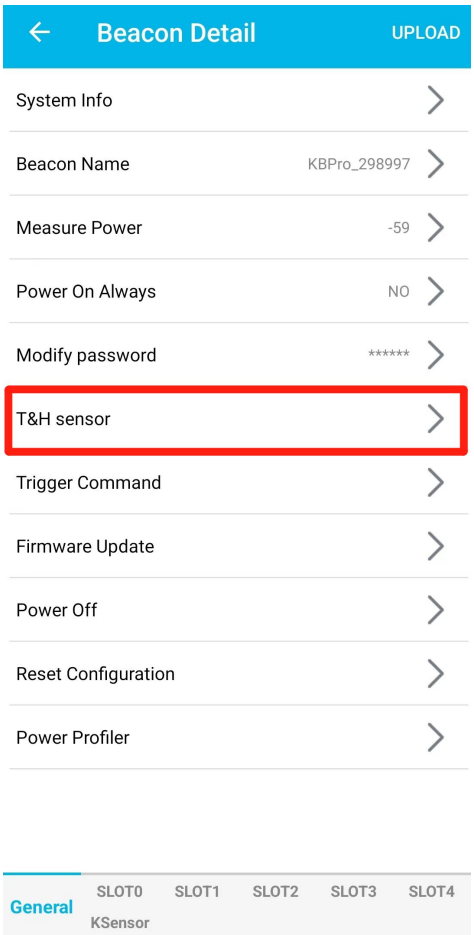
  For example. If you set 'Trigger Adv Slot'of 'Button single click' to be SLOT0, and SLOT0 is iBeacon, then iBeacon will be broadcasted only when the button single click happens

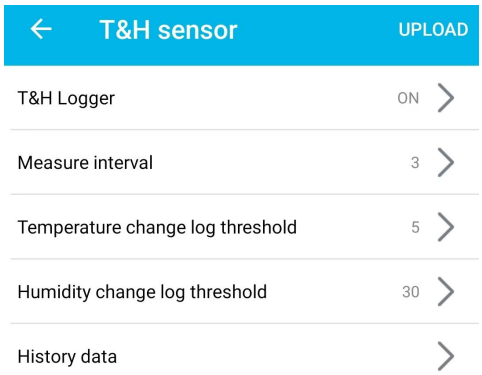


## 3.5 How to configure Sensor

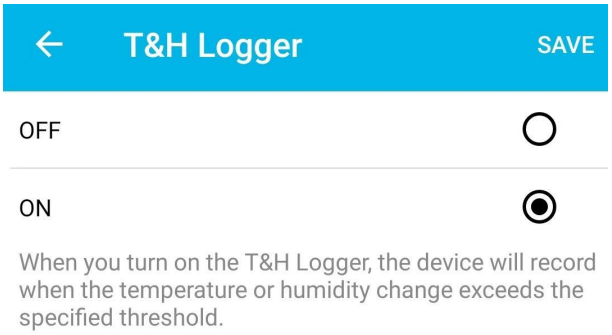
For some KBeacon models with sensor, parameters can be configured.

- Temperature & Humidity Sensor (K23/K6P/K6PS/K6PB/K6PT)

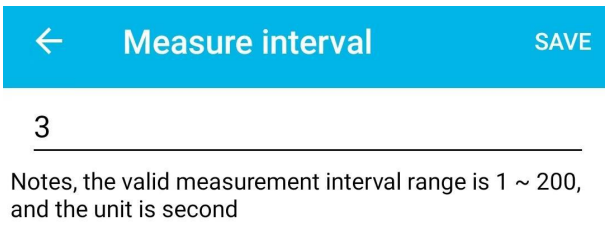


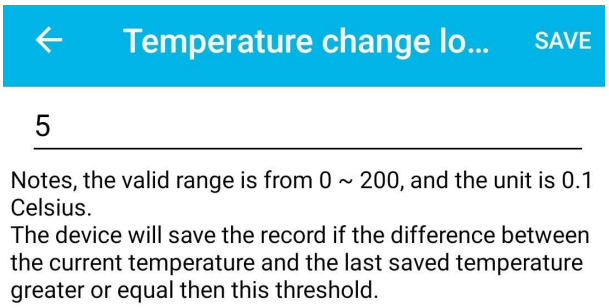

**T&H Logger:** When this feature is on, the device will record when temperature/humidity change exceeds the threshold you set.



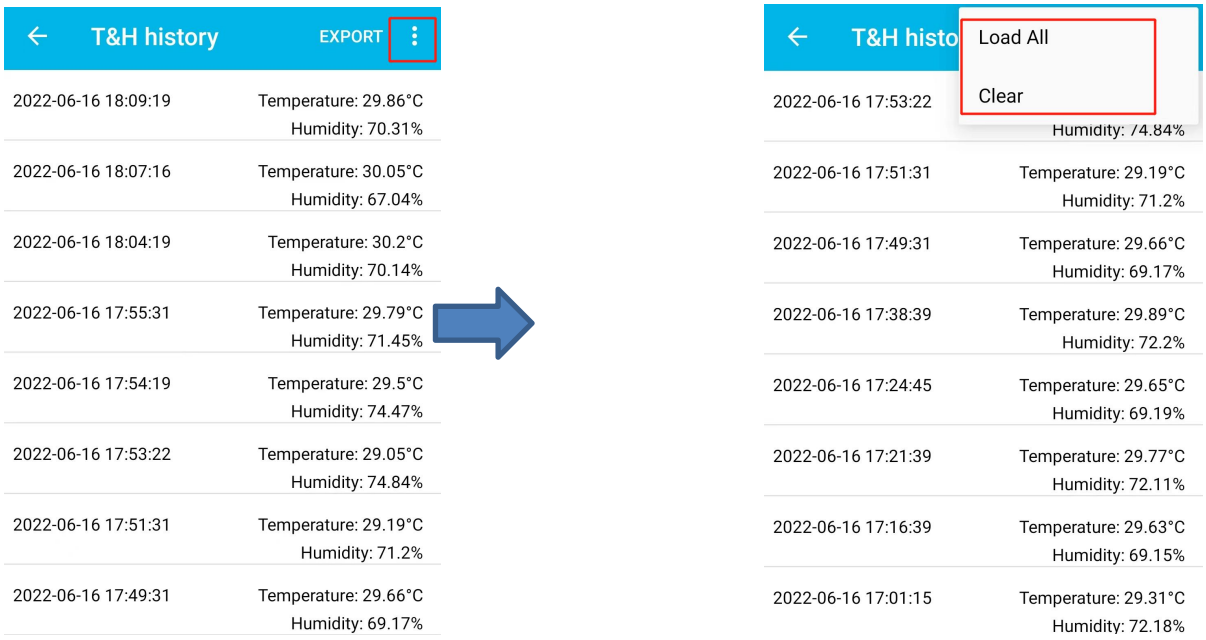
**Measure interval:** Time interval for measuring temperature and humidity.



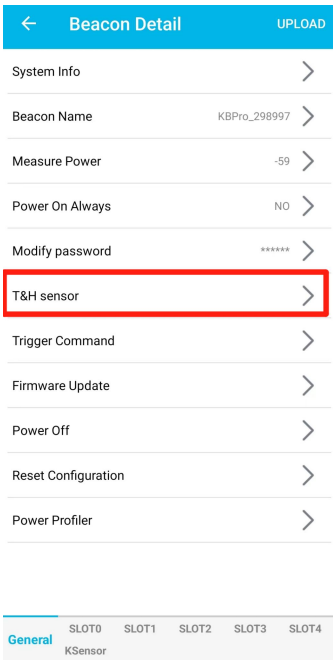

**Temperature / Humidity change log threshold:** If you set a value (take 5 as an example, it means 0.5 Celsius), the device will save the record if the difference between the current temperature / humidity and the last saved temperature / humidity greater or equal than 0.5 Celsius.

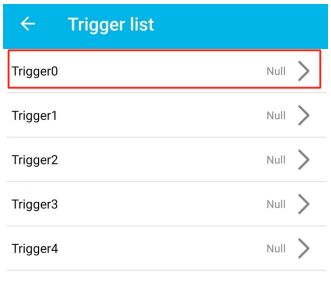


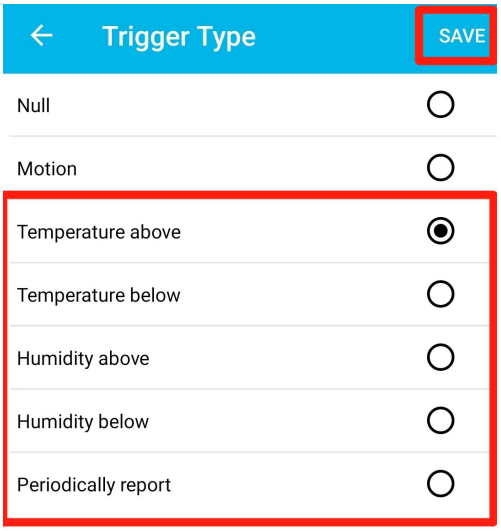

**History data:** The data can be loaded or cleared.

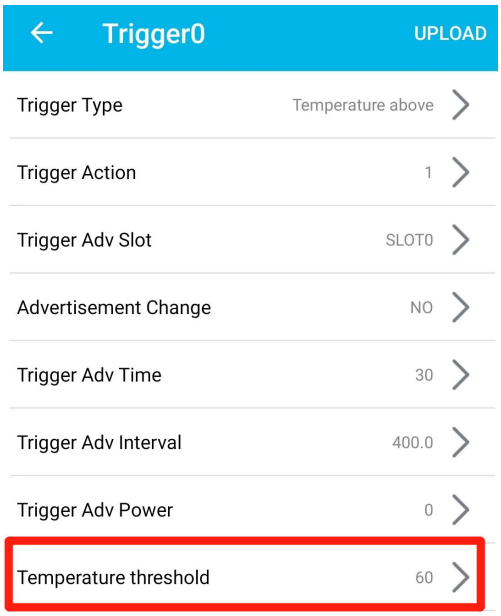


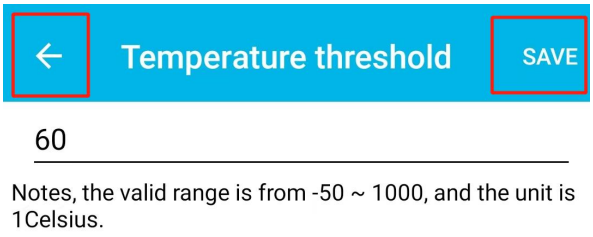
**Trigger Command:** The feature and setting is same as 3.4 except “Temperature threshold” in “Temperature/Humidity above/below”. If you set a value (take 60 as an example, it means 6 Celsius), when the temperature is above 6 Celsius the trigger event happens.

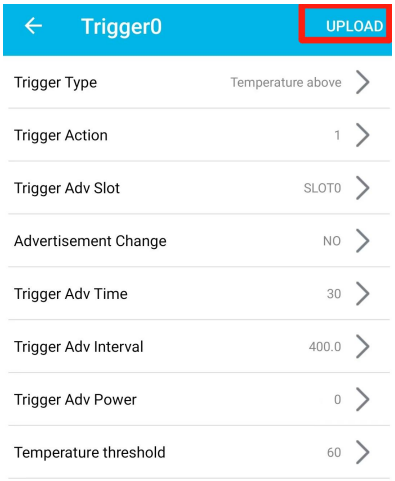




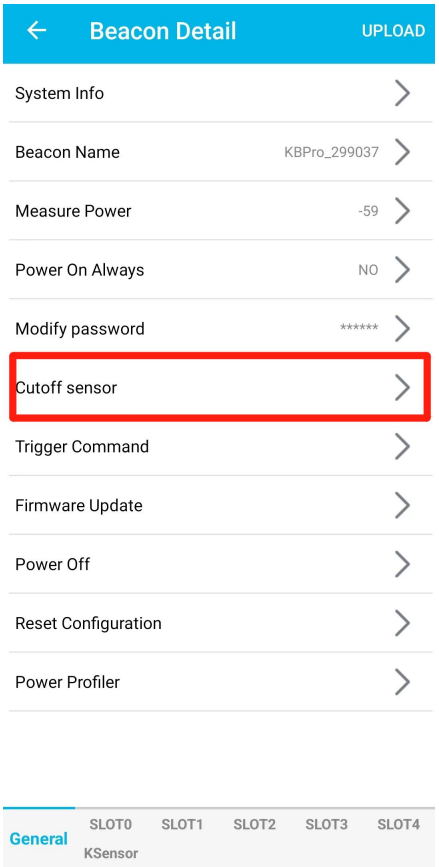



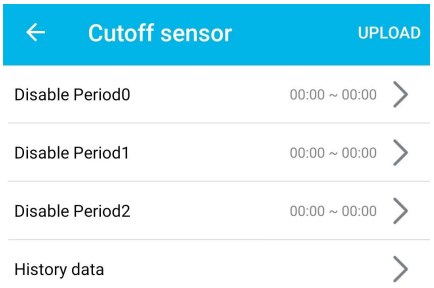



Click “Save” and return, then click “Upload”.

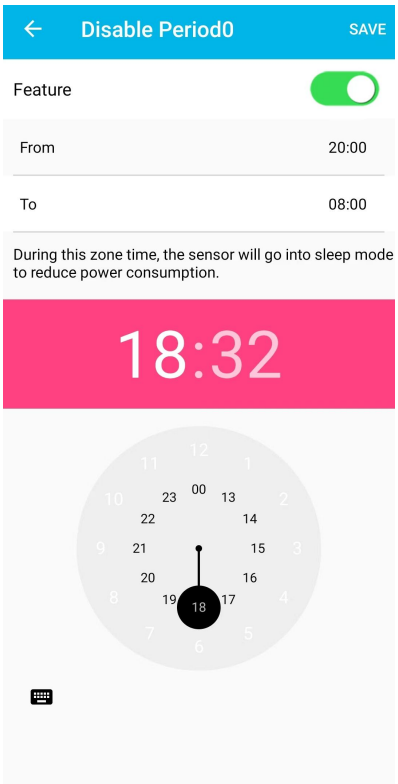
- Cutoff Sensor (S1)

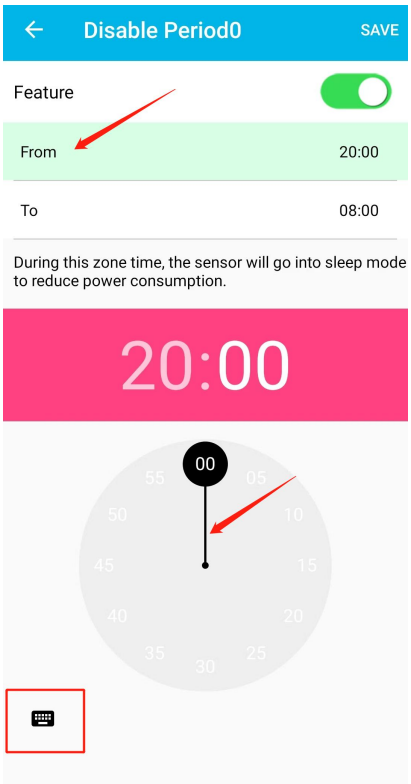


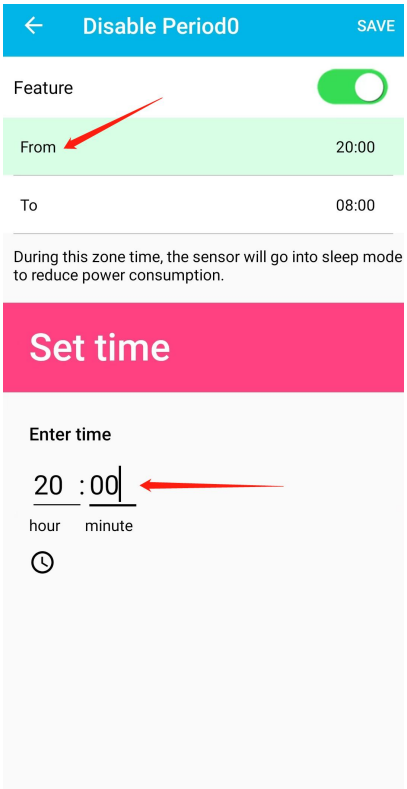




Cutoff 0 means S1 is installing well and closed;
Cutoff 1 means S1 is installing well and opened;
Cutoff 2 means S1 is not installing well and closed, the black button (at the bottom of the device) didn't press down;
Cutoff 3 means S1 is installing well and opened, the black button didn't press down.

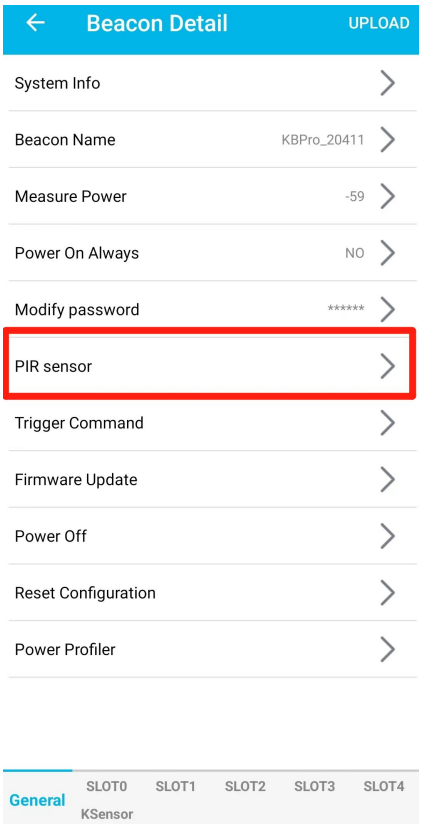
**Disable Period:** When this feature is on, you can set the time period of sleep mode by turning the hour hand and minute hand, or input the time through the keyboard.

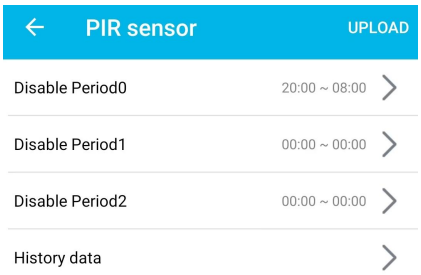



- PIR Sensor (S2)

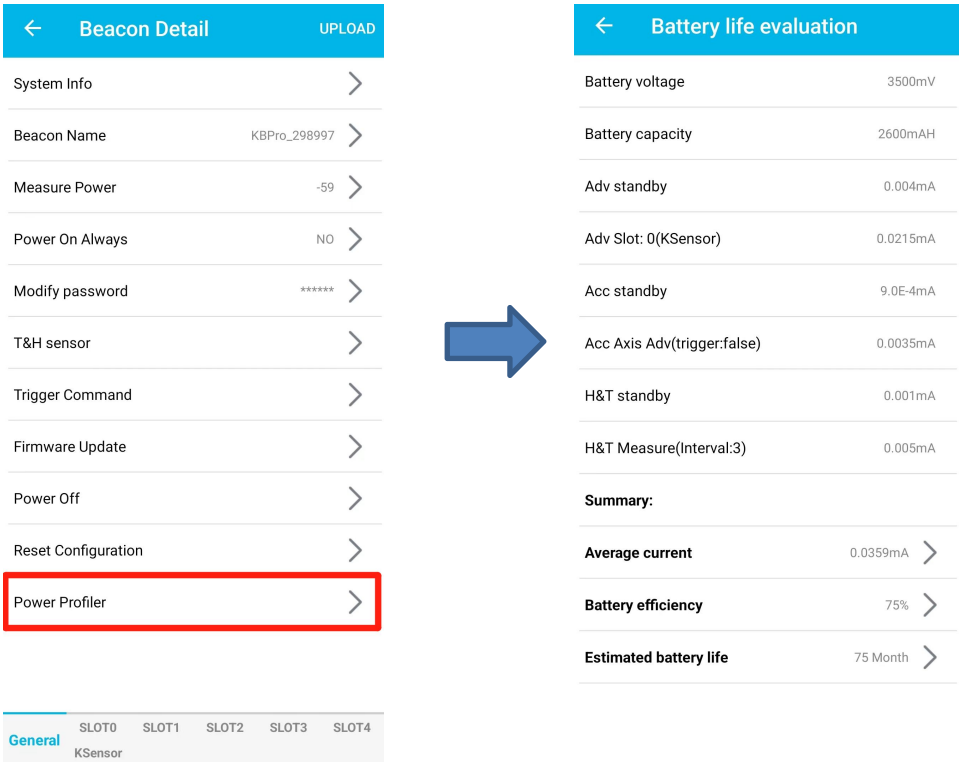



The configuration is same as “Cutoff Sensor”.

## 3.6 How to evaluate battery life

KBeaconPro supports evaluating the battery life of beacon according to the configured parameters.




**Average current**: The average current of the device is based on the current configuration parameters, and is calculated after the device is powered on for 30 seconds for current stabilizes. The average current does not include power consumption by trigger broadcasting. Also, it does not include the power consumption when the device was connected.

**Battery efficiency**: Usually the battery capacity is based on the ideal 1mA discharge model at room temperature. In actual use, the capacity of the battery is related to temperature, current and self-discharge. We recommend 75%.

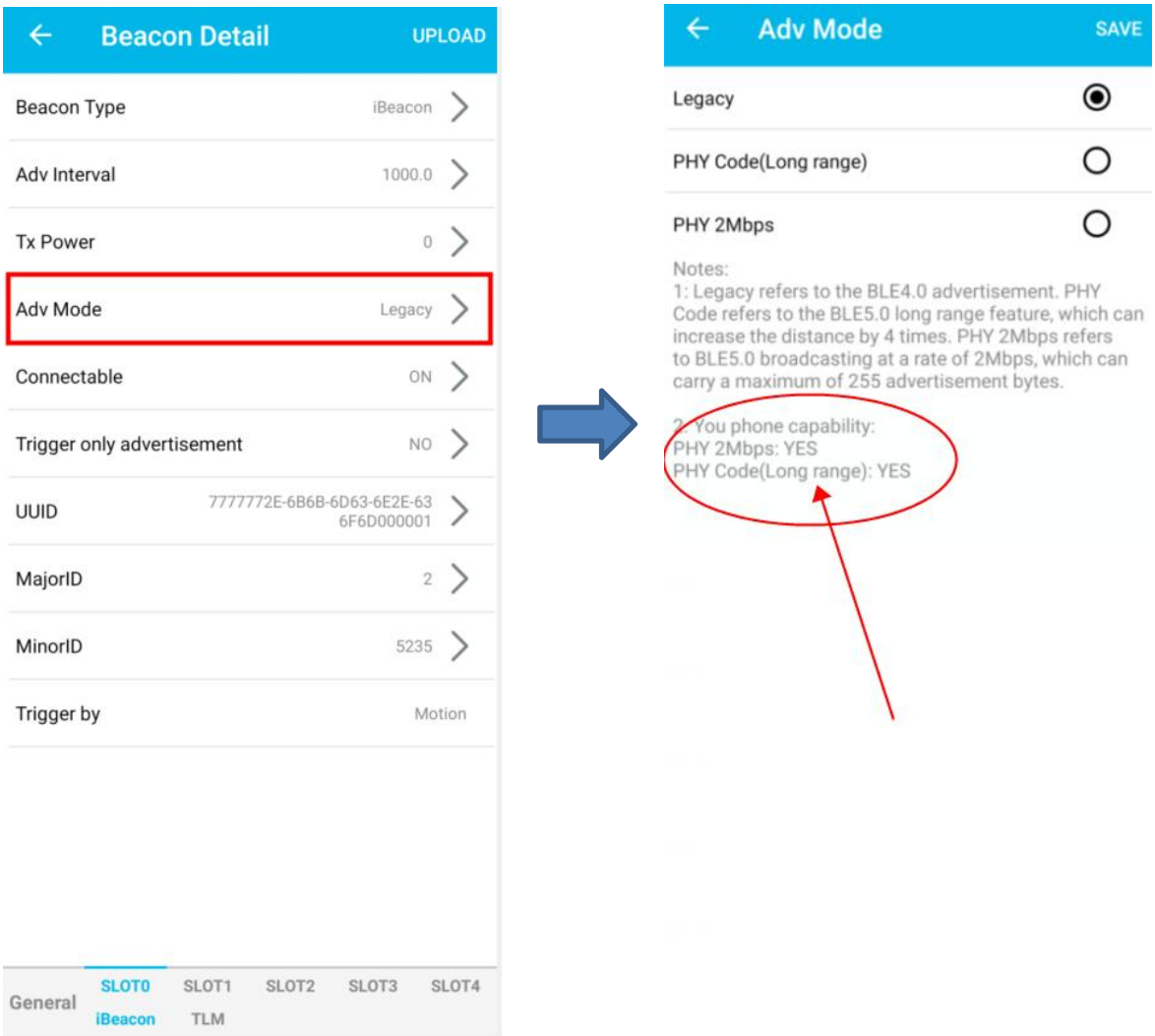
**Estimated battery life**: Estimated battery life = Battery capacity * Battery efficiency/ Average current/24(hours)/30(days)

## 3.7 How to configure Adv Mode

For some KBeacon models that support BLE5.0 long range feature, 'Adv Mode' can be configured.

- **Legacy:** BLE 4.0 advertisement
- **PHY Code:** BLE 5.0 long range feature
- **PHY 2Mbps:** BLE5.0 broadcasting at a rate of 2Mbps

KBeaconPro App can detect which Adv Mode your phone support (Only supported on Android phones).




**Reminder:**

Please make sure that your phone supports BLE 5.0 PHY Code(Long range) feature, otherwise you will not be able to scan the PHY code advertisement if the Beacon was set to PHY Code(Long range) Mode.

If you set the Beacon to PHY code advertisement, and your phone doesn't support PHY Code broadcast, you can force the device to enter the Legacy mode for 30 seconds by single click the button of the device.

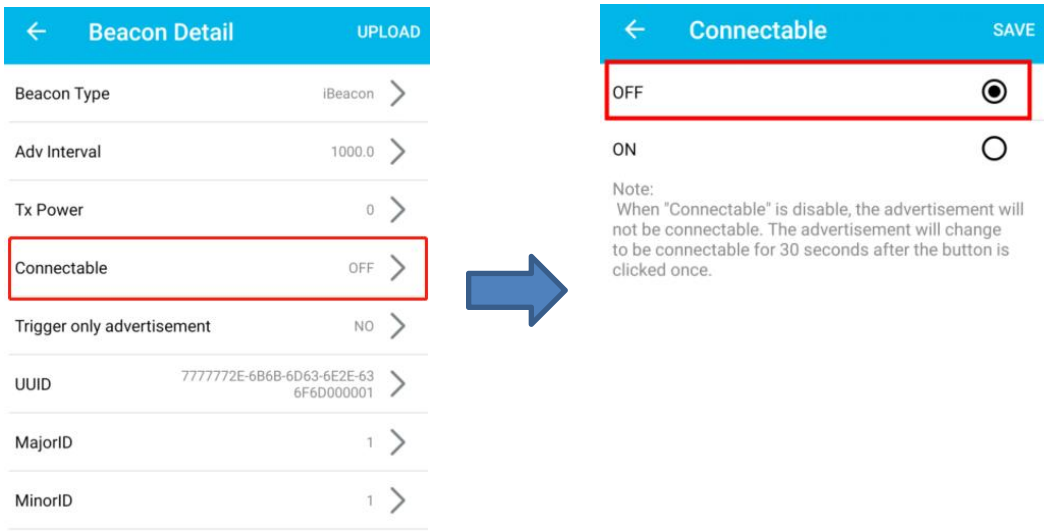
# 4. Other settings

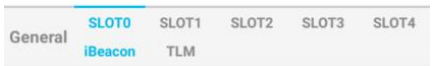
## 4.1 Unconnectable mode

Each SLOT has two different advertising status, connectable mode and unconnectable mode. Only when the advertising status is connectable, the KBeacon is configurable. But the unconnectable mode saves about 10% -20% power consumption than connectable mode.

After the KBeacon is deployed, we recommend setting the KBeacon to be unconnectable mode. This can lower battery power consumption and the Beacon also have better security performance.

How to set unconnectable mode: Tap: Connectable—> OFF—> Save—>Return —>UPLOAD.



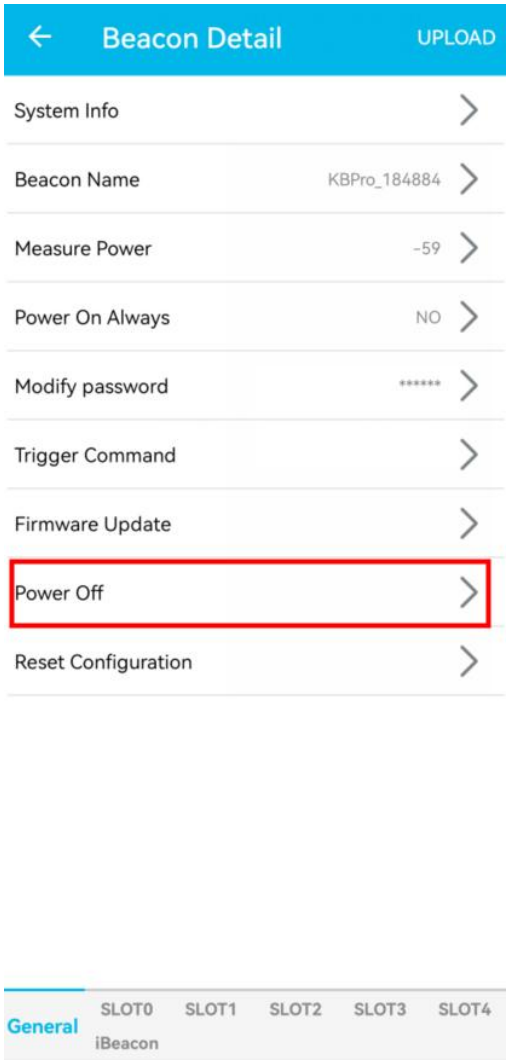

**Question: How can I configure KBeacon again if it was set to be unconnectable mode?**

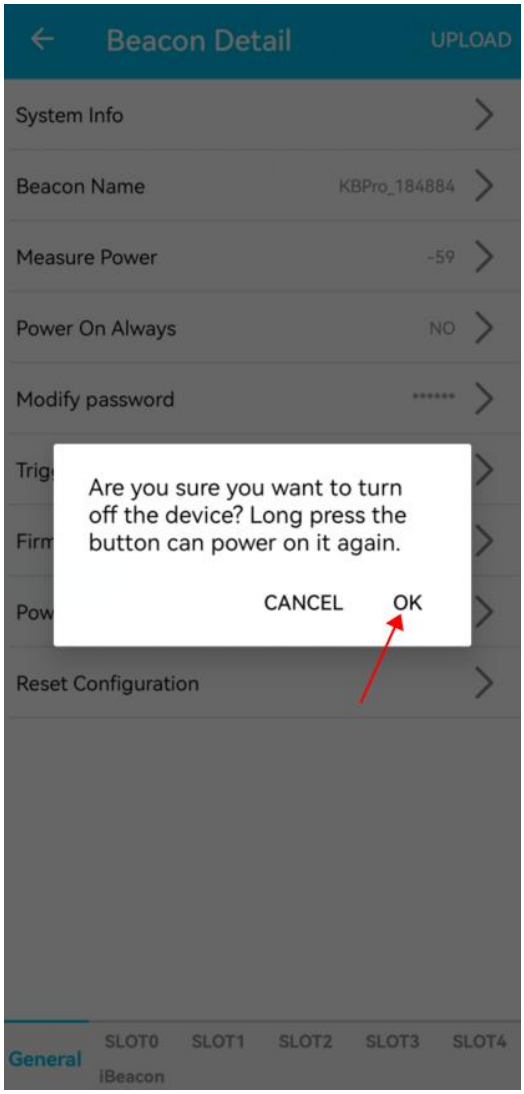
- For KBeacon with button: click the button, the Beacon will enter a connectable mode for 30 seconds, users can connect the device within these 30s. Or re-install battery.
- For KBeacon without button: Re-install battery
- **Reminder: For the KBeacon device that doesn't have button and whose battery can not be re-installed, once the device was set to unconnectable mode, it can not be confirgured any more!**

## 4.2 Power Off

For KBeacon device WITH BUTTON, you can use the App to turn off the device.

Tap: Power Off—> OK

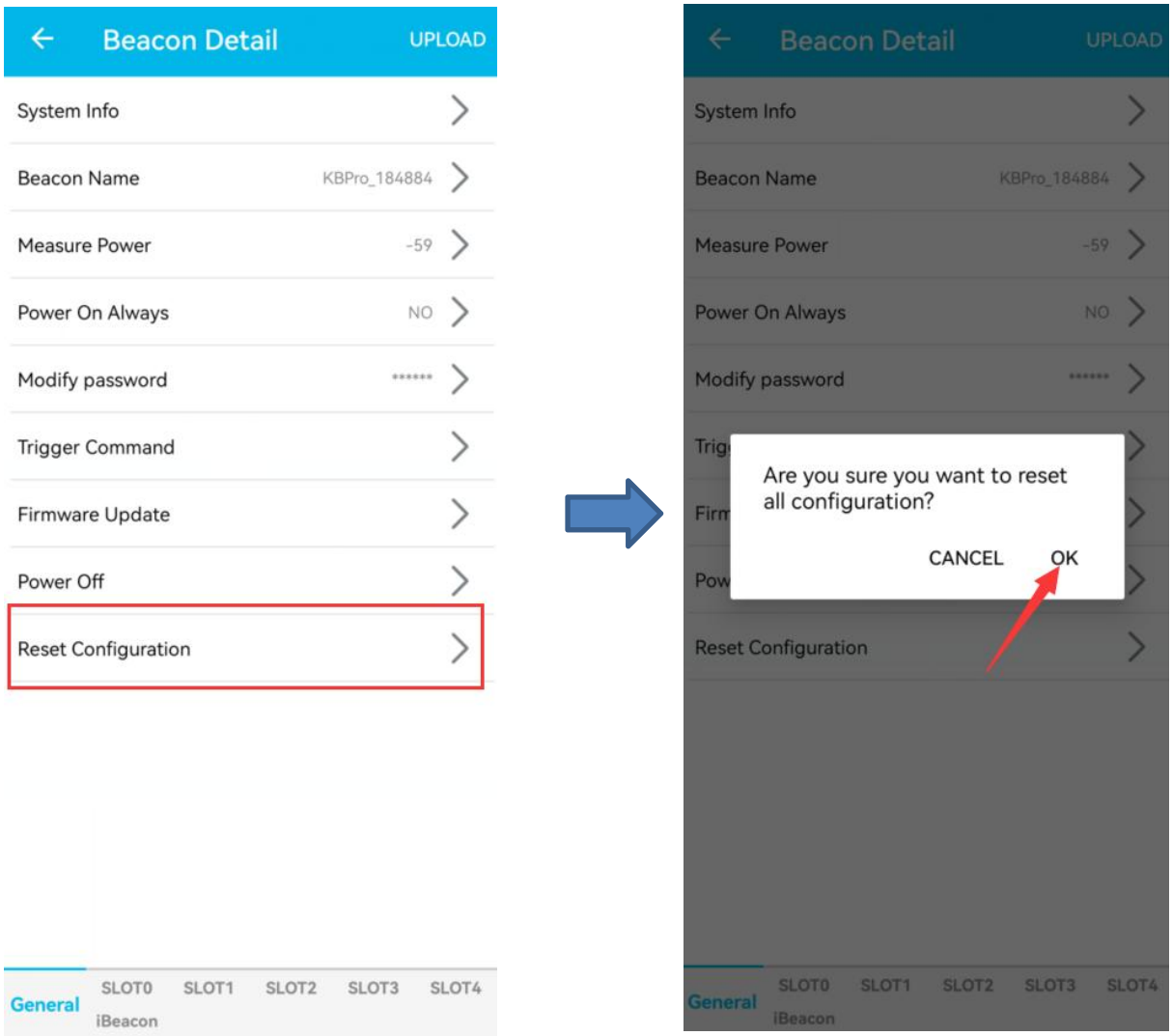


## 4.3 Reset configuration

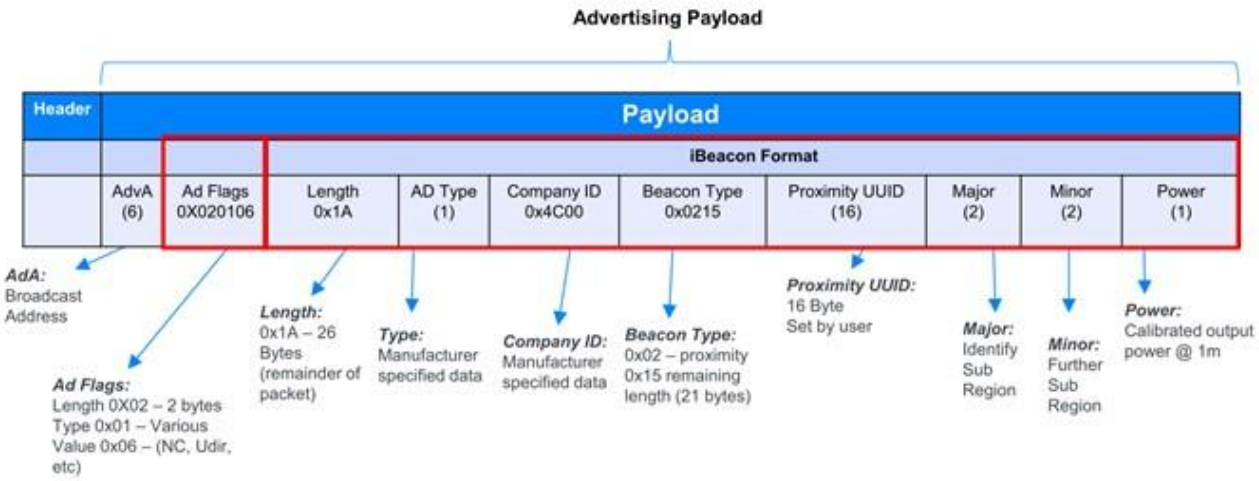
You can reset the KBeacons setting to factory default configuration on the App.

Tap: Reset configuration—> OK



# 5. KBeacon payload

## ● iBeacon payload struct




How to calculate distance from iBeacon signal:

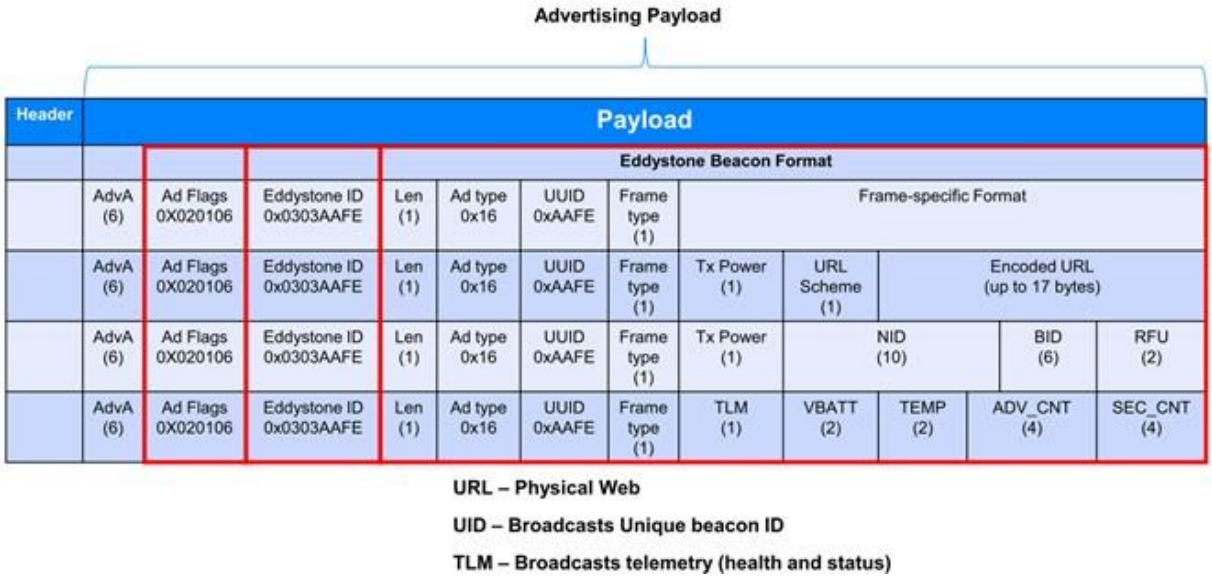
Formula:

distance = 10^((abs(RSSI) - abs(Calibrated Power)) / (10 * n))

And：

- ◆ RSSI: received rssi on phone
- ◆ Calibrated Power: Calibrated power at 1 meters
- ◆ n: environment factor, typical value is 2.0

## ● Eddystone payload struct



## KSensor payload struct

1. The advertising data packet of KSensor is defined by KKM. Please refer to the following table for details.

| Offset | Length | Type | value |
|---|---|---|---|
| 0 | 1byte | AdvA | 0x6 |
| 1 | 3byte | AdvFlags | 0x020106 |
| 4 | 4byte | ID | 0x0303AAFE |
| 8 | 1byte | Length | |
| 9 | 1byte | Adv type | 0x16 |
| 10 | 2byte | UUID | 0xAAFE |
| 12 | 1byte | Frame Type | 0x21 |
| 13 | 1byte | Version tag | 0x1 |
| 14 | 1byte | Sensor mask | 0bit: voltage;<br>1bit:temp<br>2bit: humidty<br>3bit: acc<br>4bit: cutoff<br>5bit: PIR indication<br>6~7bit: reserved |
| 15 | 2byte | Voltage | big-endian battery voltage, unit is mV |
| 17 | 2byte | Temperature | Exist if temp bit set 1.<br>Temperature, Fixed Point 8.8 format |
| 19 | 2byte | Humidity | Exist if humidty bit set 1.<br>Temperature, Fixed Point 8.8 format |
| 21 | 2byte | Acc axis X pos | Exist if acc bit was set 1.<br>big-endian axis X, unit is mg |
| 23 | 2byte | Acc axis Y pos | Exist if acc bit was set 1.<br>big-endian axis Y, unit is mg |
| 25 | 2byte | Acc axis Z pos | Exist if acc bit was set 1.<br>big-endian axis Z, unit is mg |
| 27 | 1byte | cutoff flag | Exist if cutoff bit was set 1.<br>bit0: 1 device was cutoff<br>bit1: 1 device was plug, 0 normal |
| 28 | 1byte | PIR flag | Exist if PIR indication bit was set 1.<br>1: The human body is detected |

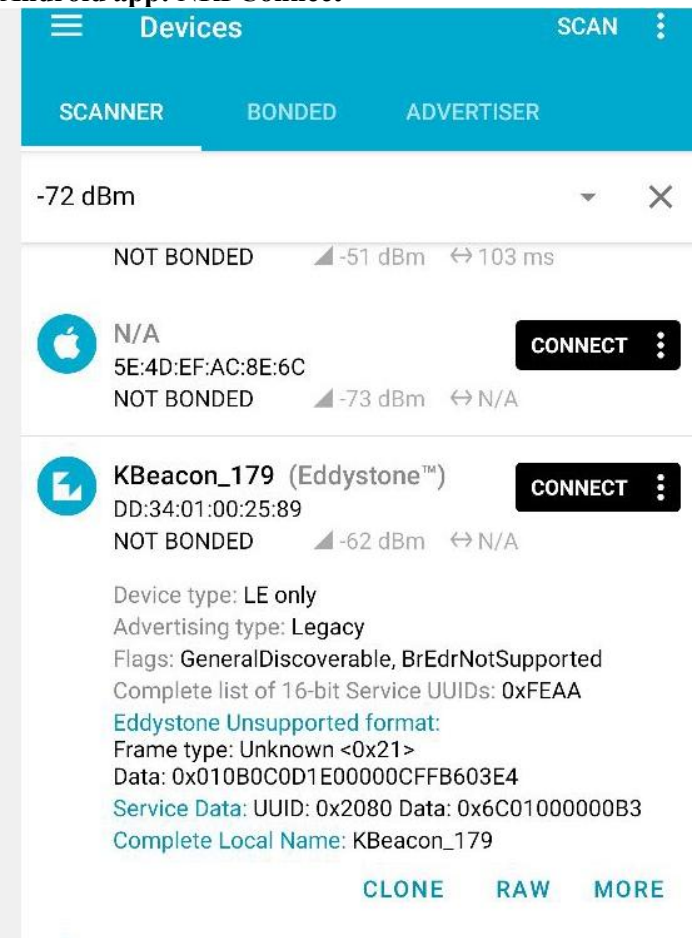
Remark:

- The uint of battery is mV. For example, if the VBATT is 3270, it means the battery voltage is 3270mV;
- Temperature. 2 bytes Fixed Point 8.8. The format is same as temperature in Eddystone TLM.

- Humidity. 2 bytes Fixed Point 8.8. The format is same as temperature in Eddystone TLM.

**The** Fixed Point 8.8 **format:**
**http://people.ece.cornell.edu/land/courses/ece4760/**

**Example for KSensor Data.**
**Android app: NRFConnect**




2. System advertisement Data Format

The advertising data packet of System is defined by KKM. Please refer to the following table for details.

| Offset | Length | Type | value |
|---|---|---|---|
| 0 | 1byte | AdvA | 0x6 |
| 1 | 3byte | AdvFlags | 0x020106 |
| 4 | 4byte | ID | 0x0303AAFE |
| 8 | 1byte | Length | |
| 9 | 1byte | Adv type | 0x16 |
| 10 | 2byte | UUID | 0xAAFE |
| 12 | 1byte | Frame Type | 0x22 |
| 13 | 1byte | Model ID | Device model ID |

| | | | |
|---|---|---|---|
| 14 | 1byte | Battery | Battery Precent |
| 15 | 6byte | Mac address | big-endian |
| 21 | 2byte | Software version | big-endian format. For example if the value is 0x0632, then version is V6.49 |

**Model ID define:**

- K1: 10
- K11: 11
- K12: 12
- B1: 13
- U1: 14
- F1: 15
- K18: 18
- K15a: 16
- K15:19
- S1: 17

- K21: 21
- B2: 22
- K21u:25
- S2:26
- K23: 23
- K23p: 24

- K3: 30
- W3: 38

- K4: 40
- K41:41
- K4u: 45
- W4: 48
- K4p: 47

- K5: 50
- K51: 51
- W52: 52
- K5p: 57
- K5pt: 58

- K6: 60
- K61: 61
- K6p: 67
- K6pb: 68
- K6ps: 69

- K7: 70
- K71: 71
- K7u: 75
- W7: 78

- K8: 80
- K8u: 85
- W8:86
- W8u:87

- K9: 90
- K91: 91
- K9P: 97
- K9Pb: 98

- P1:101
- B1u:102
- P2: 102

FCC Caution:
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.
If this equipment does cause harmful interference to radio or television reception,
which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
-- Reorient or relocate the receiving antenna.
-- Increase the separation between the equipment and receiver.
-- Connect the equipment into an outlet on a circuit different
from that to which the receiver is connected.
-- Consult the dealer or an experienced radio/TV technician for help.
The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure condition without restriction.