

SC833F, SC832AF Open Source BLE 5.2 Sensors

OpenSource with Market Ready Enclosure

SC833F wireless sensor and SC833AF beacon support Bluetooth 5.2, Thread, or Zigbee radio protocols. They are in market ready enclosure.

- Supports BLE 5.1 directional finding with firmware upgrade
- Supports BLE 5.2, 802.15.4 radio protocols
- Supports BLE 5.0 long range or CODED-PHY.
- BC833F with AMS ENS 210 temperature and humidity sensor, and ST Micro LIS3DH 3-axis motion sensor.
- Preloaded with firmware broadcasting iBeacon or Eddystone messages
- OpenSource codes are available
- Android OS app.
- Size: 31x30x10mm
- Uses a CR2032 battery, not included.
- Includes a 3M Dual Lock Velcro fastener.

Long Range Beacon and Sensor

Both BM833 and BM833AF modules support BLE 5 CODED PHY at 125 Kbps. Both modules use high performance PCB antenna.

Firmware Development

You can use preloaded codes broadcasting iBeacon or Eddystone messages or develop your own codes.

- Generate codes with Fanstel private key private.pem and OTA upgrade.
- Use a Nordic DK to erase and reprogram through SWD port.

Nordic nRF52 Development Environment

Nordic nRF52 development environment is used to develop BM833AF and BM833F codes. Open source codes are available

<http://www.fanstel.com/download-opensource/>



Wireless Sensor Summaries

	SC833F	SC833AF
BLE module	BM833F	BM833AF
Radio protocols	Bluetooth, Thread, Zigbee	Bluetooth, Thread, Zigbee
Power supply	CR2032, not included	CR2032, not included
Temperature, humidity sensor	AMS ENS 210	None
Motion sensor	ST Micro LIS3DH	None
QDID		
Range with an Android phone, 1Mbps	100 meters, est.	100 meters, estimated
Range with a Fanstel Gateway, 125 Kbps	1000 meters, estimated	600 meters, estimated

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SC833F, SC832AF Open Source BLE 5.2 Sensors

1. Hardware Description

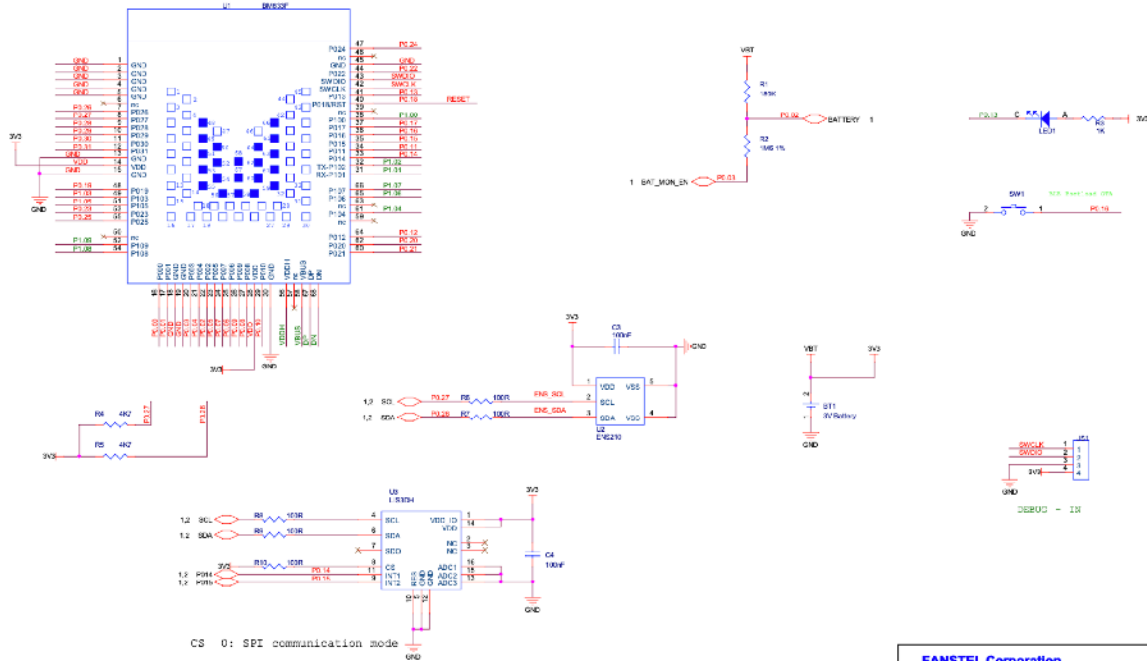
SC833F Long Range Wireless Sensor

- A Fanstel long range BLE 5.2 module BM833F is used to support BLE, Thread, and Zigbee radio protocols.
- SC833F includes an AMS ENS210 temperature and humidity sensor, and an ST Micro LIS3DH 3-axis motion sensor.
- Preloaded firmware reads sensor data from ENS210 and LIS3DH and broadcasts in iBeacon or Eddystone message format. Message format is user selectable by an Android OS app.
- Embedded Cortex M4F MCU with 512KB flash, 256 KB RAM can process motion, temperature, and humidity sensor data before sending to a smartphone or IoT gateway. This firmware is not included in preloaded codes or open source codes.
- If you use Fanstel private key (private.pem) to generate codes, you can do DFU OTA for firmware upgrade with a smart phone..
- To erase and reprogram BM833F codes, you need to solder wires from JS1 (SWDIO, SWDCLK, GND and VDD pins) to the corresponding pins on Nordic nRF52840DK board. Because of enclosure size, no connector is installed.



- We recommend using Nordic nRF Connect software tools for programming.
- If you a private key to generate codes, you can use the same private key for new codes. Upgrade can be by OTA.

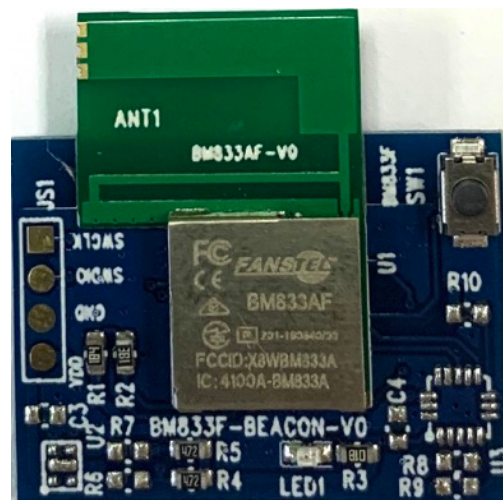
SC833F Schematics



FANSTEL Corporation.

SC833AF

- SC833AF uses BM833AF, an nRF52811 long range module instead of BM833F in SC833F
- LIS3DH motion sensor and ENS210 temperature and humidity sensors are not installed for SC833AF.



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2. Firmware Development and Testing

Basic Software tool for SC833,SC833AF

Download and set up the following software tools.

nRF command line tool 10.2.1 or newer.

<https://www.nordicsemi.com/Software-and-Tools/Development-Tools/nRF-Command-Line-Tools/Download>

nRF Connect desktop 3.2.0 or newer.

<https://www.nordicsemi.com/Software-and-Tools/Development-Tools/nRF-Connect-for-desktop>

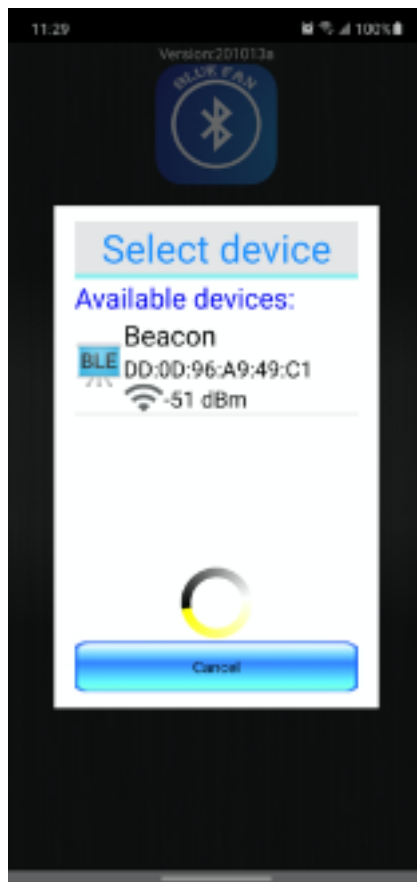
The default source code and HEX code can download from following link

<https://www.dropbox.com/sh/89x2ugg5gkIgyli/AAB9dtf9KsYlY0Xf0NACEKDEa?dl=0>

SC833AF

The SC833AF beacon is pre-loaded with beacon demo codes. It can be setup by using Android APP. It begins BLE advertising after powering-up reset

Download Bluenor beacon from Google Play store and install. Open Bluenor beacon Android App.



SC833F, SC832AF Open Source BLE 5.2 Sensors

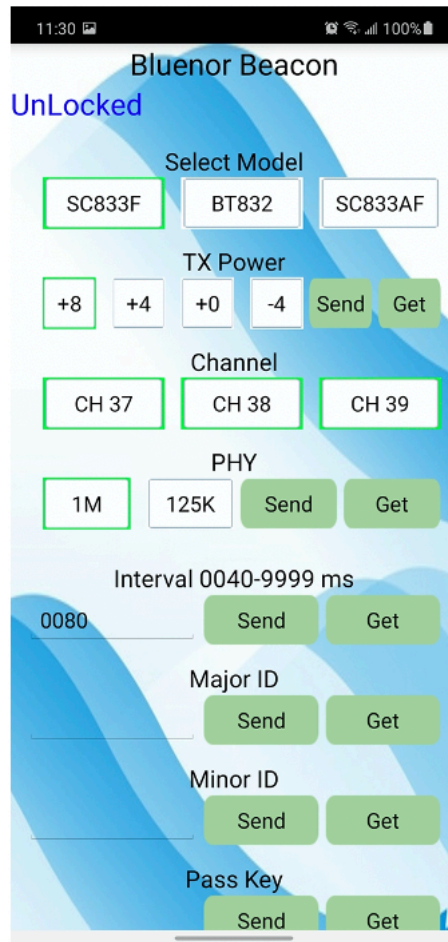
Connect to the Beacon (SC833AF)

Enter the default pass key "0000".



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You can set up beacon parameters with the app..



SC833F, SC832AF Open Source BLE 5.2 Sensors

The source project is located at
 ~\nRF5_SDK_17.0.2_d674dde\examples\ble_peripheral\BlueNor_Beacon\pca10056\s112\s

In the main.c , please make sure of enabling BC833A and disabling BC833.

```

  //#define BC833
  #define BC833A
  
```

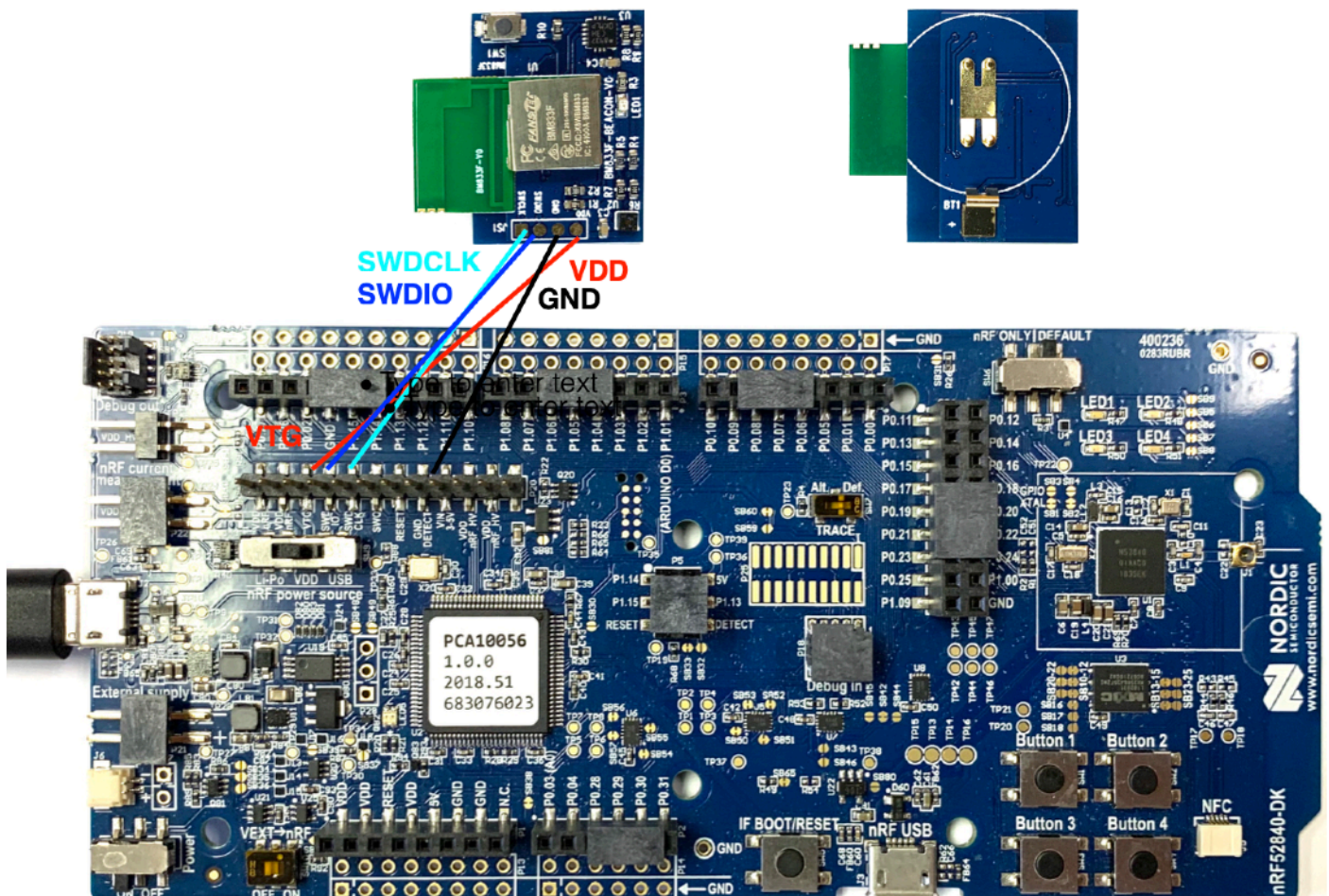
Programming the SC833AF.

If you use Fanstel “published” private key, private.pem to generate your codes, programming can be by OTA. Private key can be downloaded from:

<https://www.fanstel.com/download-opensource>

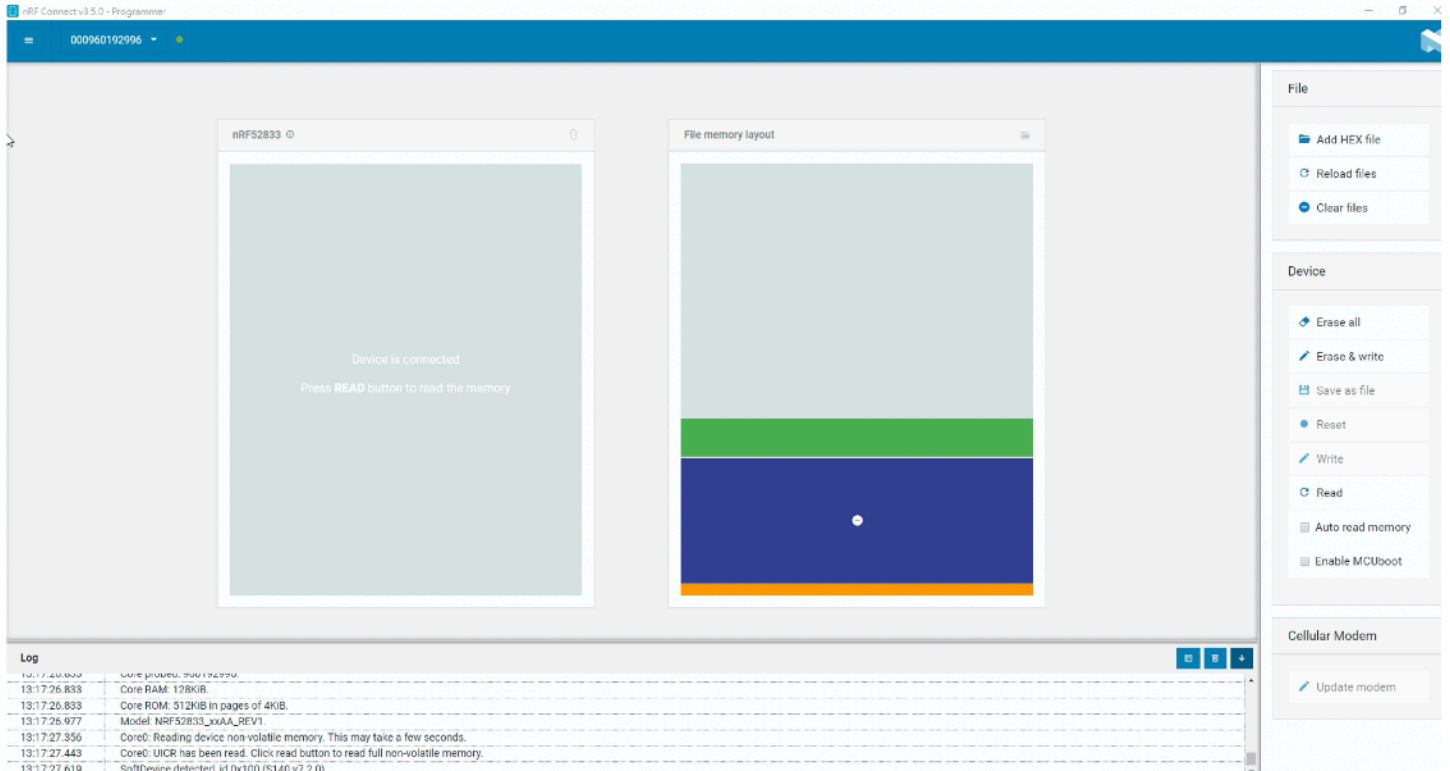
If you wish to use your own private key, you need to erase all and reprogram codes in SC833AF.

- Re-build the project.
- Connect nRF52840 DK or nRF52833 DK to SC833AF as below.
 - Connect DK VTG pin to SC833AF VDD pin
 - Connect DK GND Detect pin to SC833AF GND pin.
 - Connect DK SWDIO pin to SC833AF SWDIO pin
 - Connect DK SWDCLK pin to SC833AF SWDCLK pin
 - Connect 3V power source to battery contacts on the back side of SC833AF.



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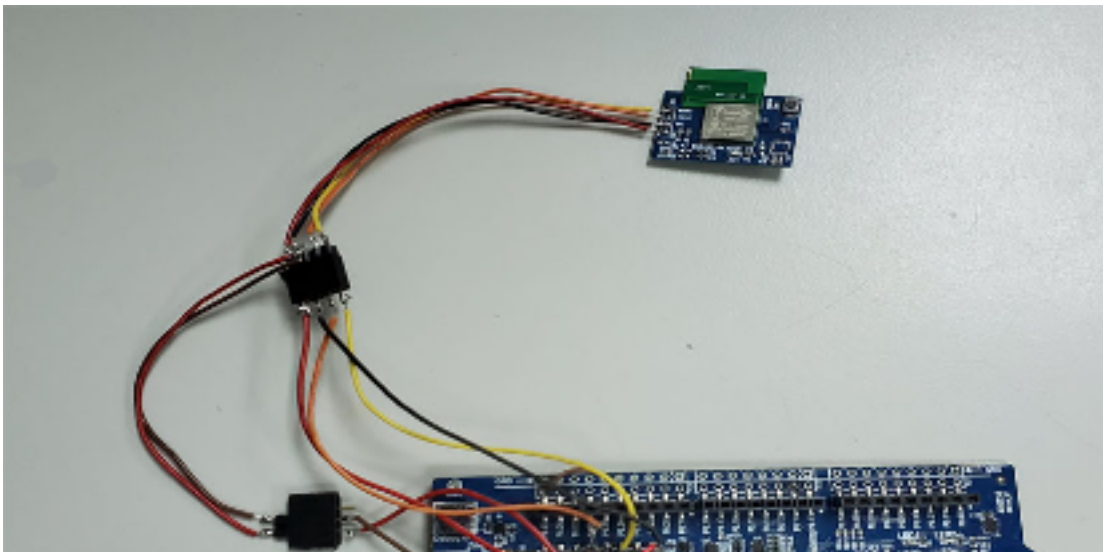
- Open the nRF connect/programmer.
- Load the HEX file and softdevice.
- Erase all
- Write the new images.



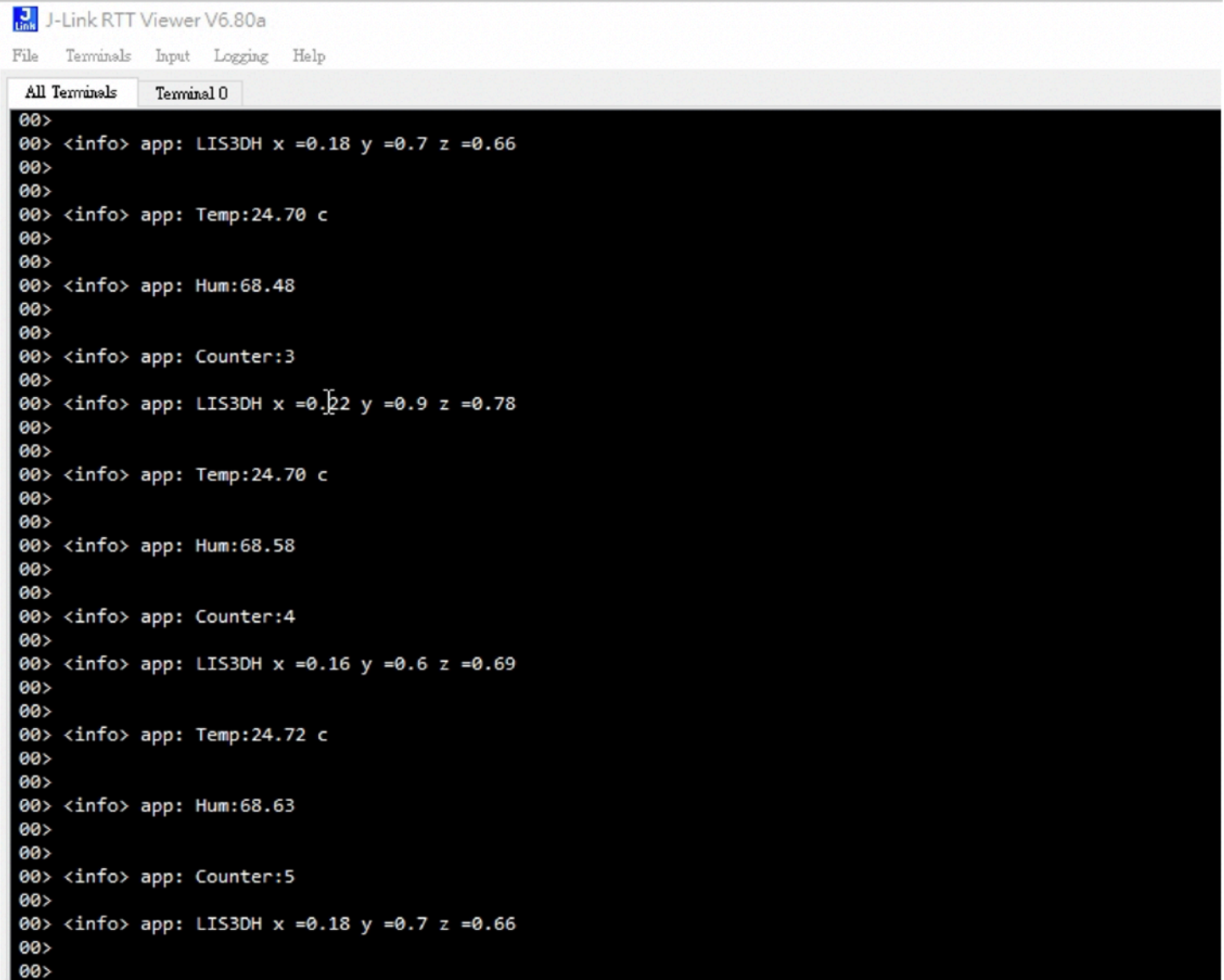
SC833F

You can connect Android app to SC833F, the same as connecting to SC833AF. The SC833F sensor includes

- AMS ENS210 temperature and humidity sensors
- ST Micr LIS3DH 3-axis motion sensor.
- Connected nRF52DK to SE833F.



- Open Segger RTT Viewer.
- This log shows the sensor is running.



```
J-Link RTT Viewer V6.80a
File  Terminals  Input  Logging  Help
All Terminals  Terminal 0
00>
00> <info> app: LIS3DH x =0.18 y =0.7 z =0.66
00>
00>
00> <info> app: Temp:24.70 c
00>
00>
00> <info> app: Hum:68.48
00>
00>
00> <info> app: Counter:3
00>
00> <info> app: LIS3DH x =0.12 y =0.9 z =0.78
00>
00>
00> <info> app: Temp:24.70 c
00>
00>
00> <info> app: Hum:68.58
00>
00>
00> <info> app: Counter:4
00>
00> <info> app: LIS3DH x =0.16 y =0.6 z =0.69
00>
00>
00> <info> app: Temp:24.72 c
00>
00>
00> <info> app: Hum:68.63
00>
00>
00> <info> app: Counter:5
00>
00> <info> app: LIS3DH x =0.18 y =0.7 z =0.66
00>
00>
```

The source project is located at
~\nRF5_SDK_17.0.2_d674dde\examples\ble_peripheral\BlueNor_Beacon\pca10100\s140\ses

In the main.c , please make sure of enabling BC833 and disabling BC833A.

```
#define BC833
//#define BC833A
```

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Programming SC833F

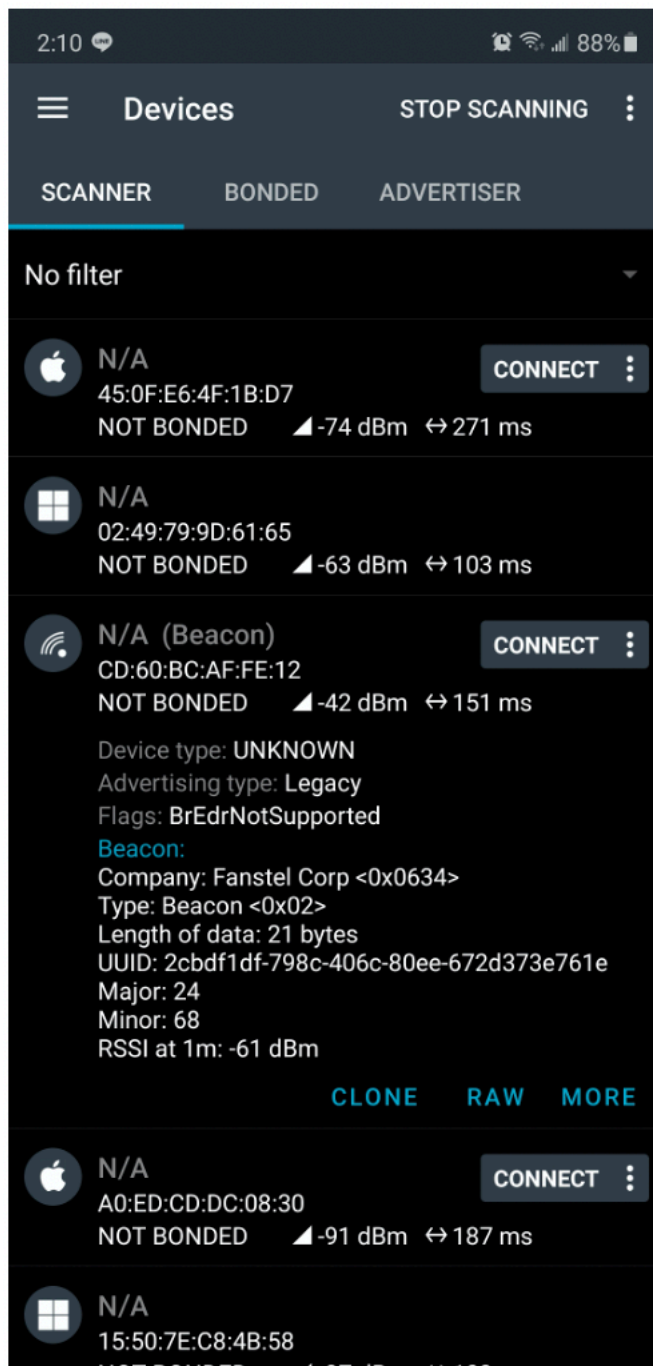
If you use Fanstel “published” private key, private.pem to generate your codes, programming can be by OTA. Private key can be downloaded from:

<https://www.fanstel.com/download-opensource>

If you wish to use your own private key, you need to erase all and reprogram codes in SC833F.

When the codes are running.

The RTT Viewer output the logs and you can see the sensor data advertising with nRF Connect for mobile APP. The temperature and humidity data display at the major, minor location.



SC833F, SC832AF Open Source BLE 5.2 Sensors

Nordic Development Environment

Nordic Semiconductor provides a complete range of hardware and software development tools for the nRF52 Series devices. nRF52 DK board is recommended for firmware development. Document and Software development tools can be downloaded by the following links.

Get start with Nordic chip and all online documents.

http://infocenter.nordicsemi.com/index.jsp?topic=/com.nordic.infocenter.nrf52/dita/nrf52/development/nrf52_dev_kit.html&cp=1_1

Nordic SDK with many example projects.

https://developer.nordicsemi.com/nRF5_SDK/

Nordic development zone. You can search or ask a question there.

<https://devzone.nordicsemi.com/tutorials/b/getting-started/posts/development-with-gcc-and-eclipse>

Programming the Nordic chip

Download and install Nrf5x-Command-Line Tools

<https://www.nordicsemi.com/eng/nordic/Products/nRF52840/nRF5x-Command-Line-Tools-Win32/58850>

Download and install nRF Connect

https://www.nordicsemi.com/?sc_itemid={B935528E-8BFA-42D9-8BB5-83E2A5E1FF5C}

Revision History

- Oct 2020, Ver. 0.90: Initial draft release

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