RF-DG-40A Bluetooth 5.0 Low Energy nRF52840 USB Dongle User Guide

Version 1.2

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Table of Contents

1 Device Overview

1.1 Description

The nRF52840 Dongle is a small, low-cost USB dongle that supports Bluetooth® Low Energy 5, Bluetooth mesh, Thread, ZigBee, 802.15.4, ANT and 2.4 GHz proprietary protocols. The Dongle is the perfect target hardware for use with nRF Connect for Desktop as it is low-cost but still supports all the short-range wireless standards used with Nordic devices. The dongle has been designed to be used as a wireless HW device together with nRF Connect for Desktop as well as programming through nRFUtil. For other use cases please do note that there is no debug support on the Dongle, only support for programming the device and communicating through USB.

It can also be used to develop code for the nRF52840 SoC mounted on the dongle. Programming is supported through a USB-enabled bootloader. Connectors for external debuggers are available.

It is supported by most of the nRF Connect for Desktop APPs and will automatically be programmed if needed. In addition, custom applications can be compiled and downloaded to the Dongle. It has a user-programmable RGB LED, a green LED, a user-programmable button as well as 15 GPIO accessible from castellated solder points along the edge. Example applications are available in the nRF5 SDK under the board name PCA10059.

1.2 Key Features

- Bluetooth 5 ready multiprotocol radio
  - 2 Mbps
  - Long Range
  - Advertising Extensions
  - Channel Selection Algorithm #2 (CSA #2)
- IEEE 802.15.4 radio support
  - Thread
  - ZigBee
- ARM® Cortex™-M4 with floating point support
- 15 GPIO available via edge castellation
- USB interface direct to nRF52840 SoC
- Integrated 2.4 GHz PCB antenna
- 1 user-programmable button
- 1 user-programmable RGB LED
- 1 user-programmable LED
- 1.7 V ~ 5.5 V operation from USB or external
- NFC available

1.3 Application

- Advanced wearables
  - Advanced personal fitness devices
  - Connected health
- IoT
  - Connected home sensors and controllers
  - Industrial IoT sensors and controllers
- Interactive entertainment devices
  - Advanced remote controls
  - Gaming controllers
  - Virtual/Augmented Reality applications

2 Hardware Description

The nRF52840 Dongle can be used as a development platform for the nRF52840 SoC. It features user-configurable LEDs, a button and an NFC connector as well as 15 GPIOs available along the board edges. In addition to radio communication, the nRF52840 SoC can communicate with a computer through USB.

2.1 Hardware Drawings

The nRF52840 Dongle hardware drawings show both sides of the RF-DG-40A board.

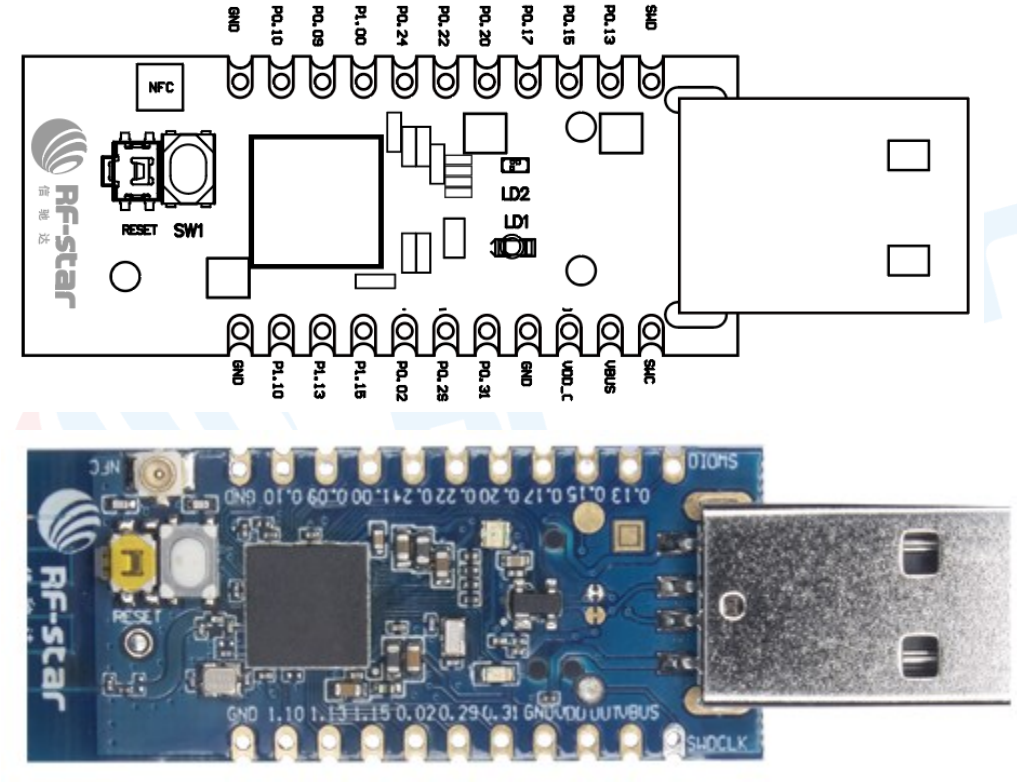


Figure 1. RF-DG-40A Dongle (Front)

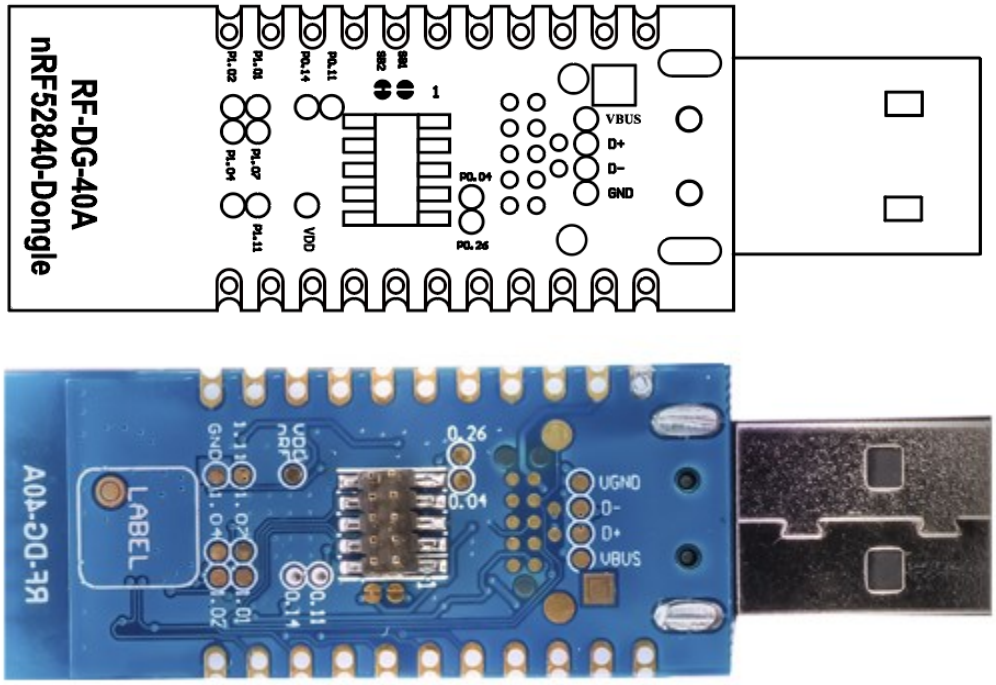


Figure 2. RF-DG-40A Dongle (Back)

The PCB footprint is as follows:

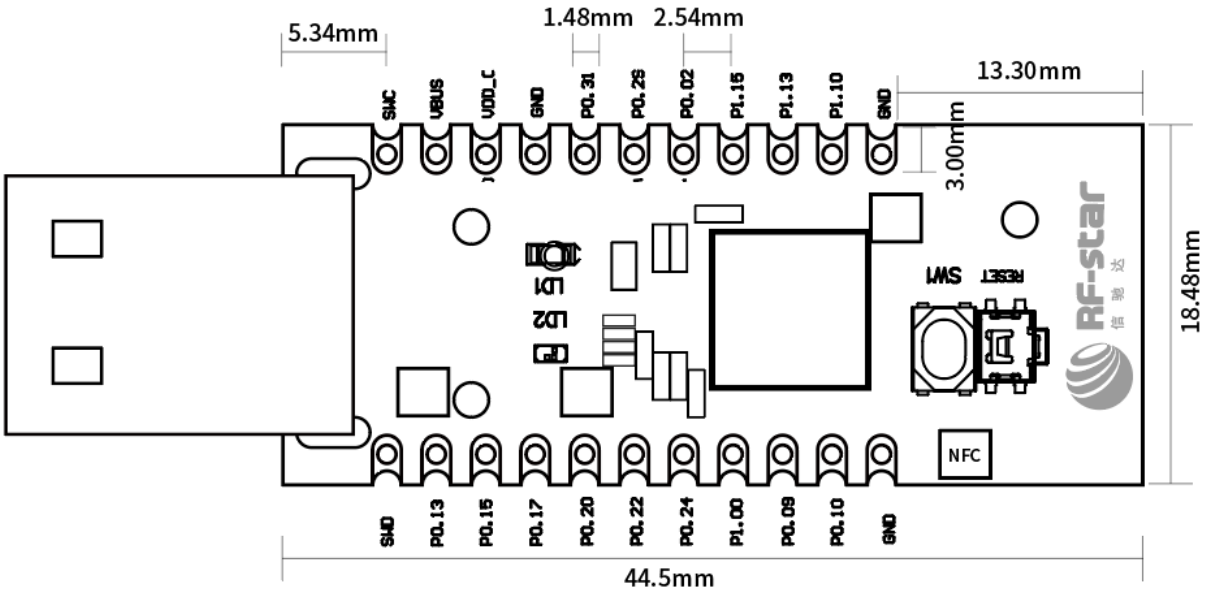


Figure 3. RF-DG-40A PCB Footprint

2.2 Block Diagram

The block diagram illustrates the nRF52840 Dongle functional architecture.

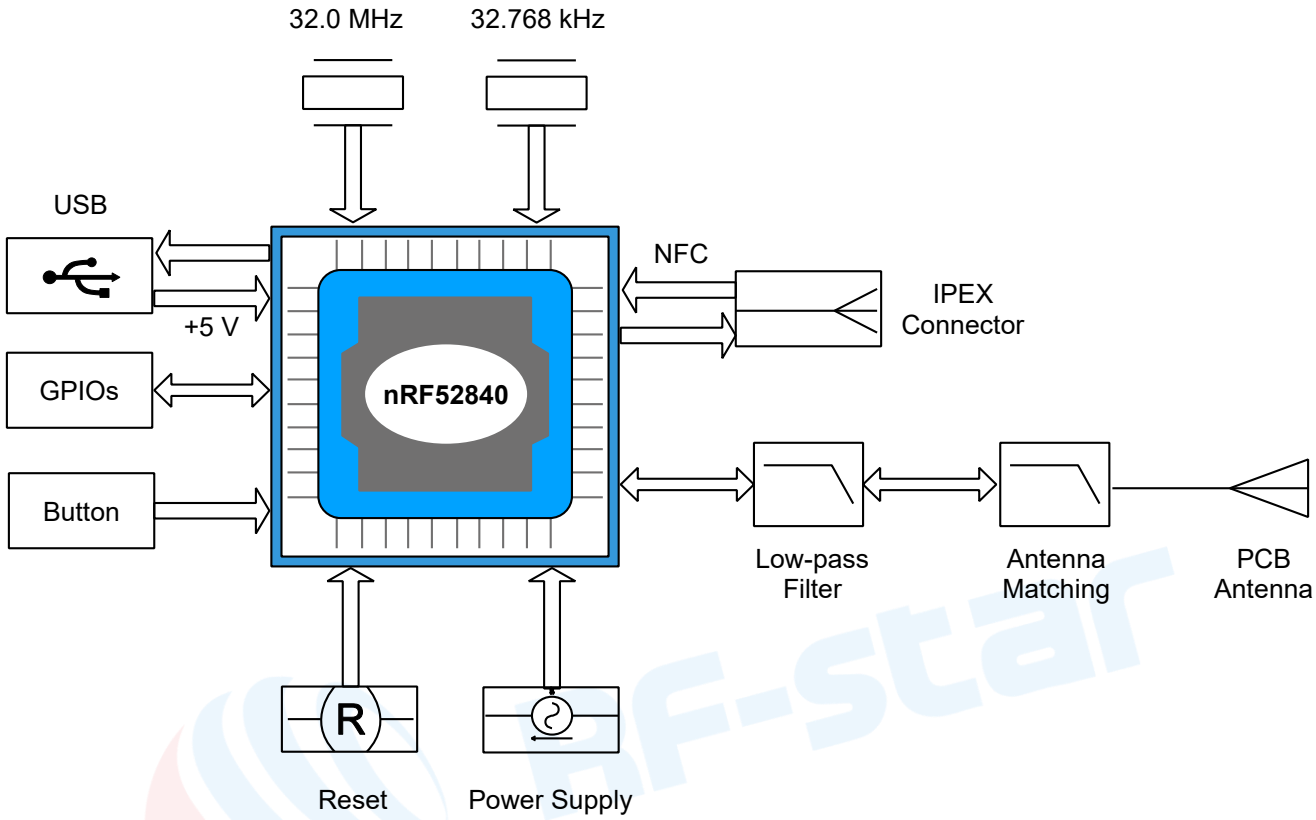


Figure 4. Block Diagram of RF-DG-40A

2.3 SWD Interface

On the backside of the nRF52840 Dongle, there are connection points for the SWD interface.

The dongle is equipped with a footprint for two different connectors. On footprint P1, a standard 2×5-pin pin header with a 1.27 mm pitch can be soldered. On footprint J2, it is possible to connect a TC2050 cable from Tag-Connect.

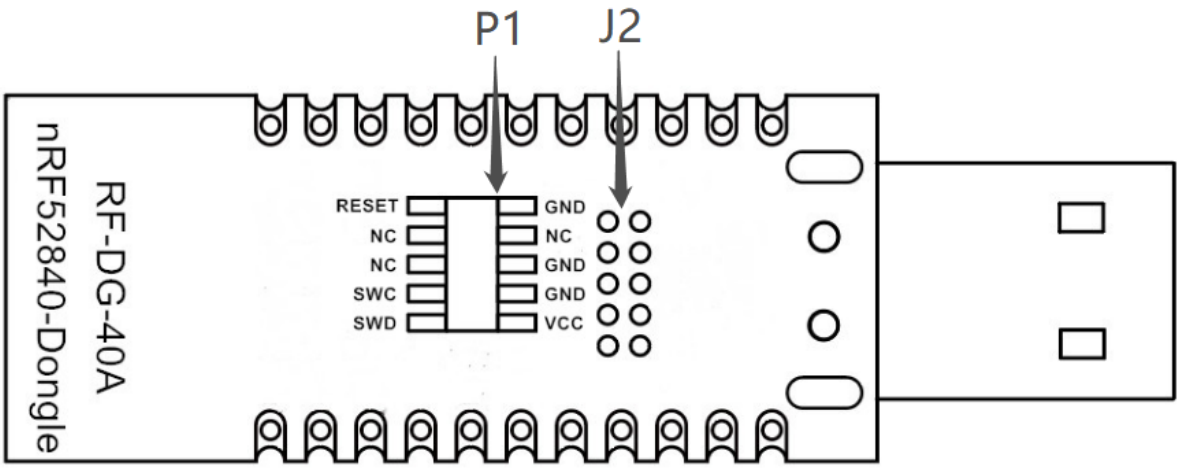


Figure 5. SWD Interface Connectors

For instance, a Nordic development kit can be used as a programmer for the Dongle.

2.4 Buttons and LEDs

The nRF528540 Dongle is equipped with a green LED (LD1), a multicolor RGB LED (LD2), a user-configurable button (SW1), and a reset button (SW2).

The LEDs and buttons are connected to dedicated I/Os on the nRF52840 SoC.

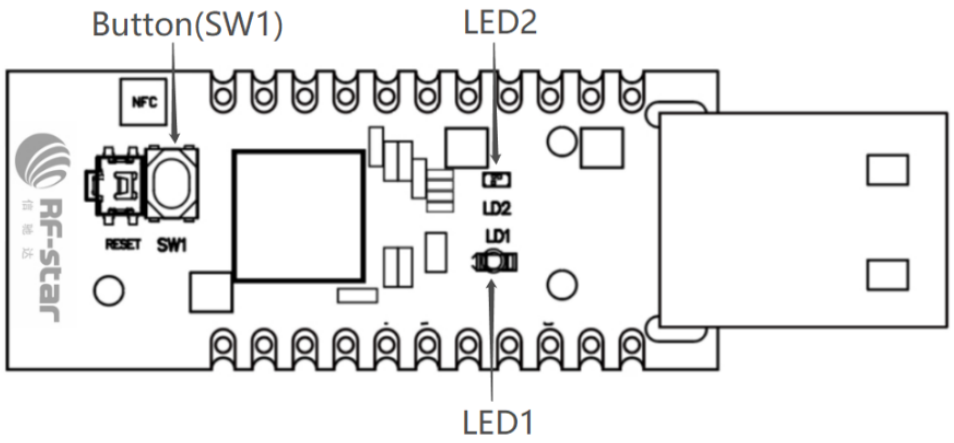


Figure 6. nRF52840 Dongle Buttons and LEDs

Part	Description	GPIO
SW1	Button	P1.06
SW2	Reset	P0.18
LD1	Green	P0.06
LD2	Red	P0.08
LD2	Green	P1.09
LD2	Blue	P0.12

The buttons are active low, which means that the input will be connected to the ground when the button is activated. The SW1 button has no external pull-up resistor, but the reset button (SW2) has a 10 k pull-up resistor. To use SW1, P1.06 must be configured as an input with an internal pull-up resistor.

The LEDs are active low, which means that writing a logical zero '0' to the output pin will illuminate the LED.

2.5 USB

The nRF52840 Dongle features a USB-A-type connector printed on the circuit board.

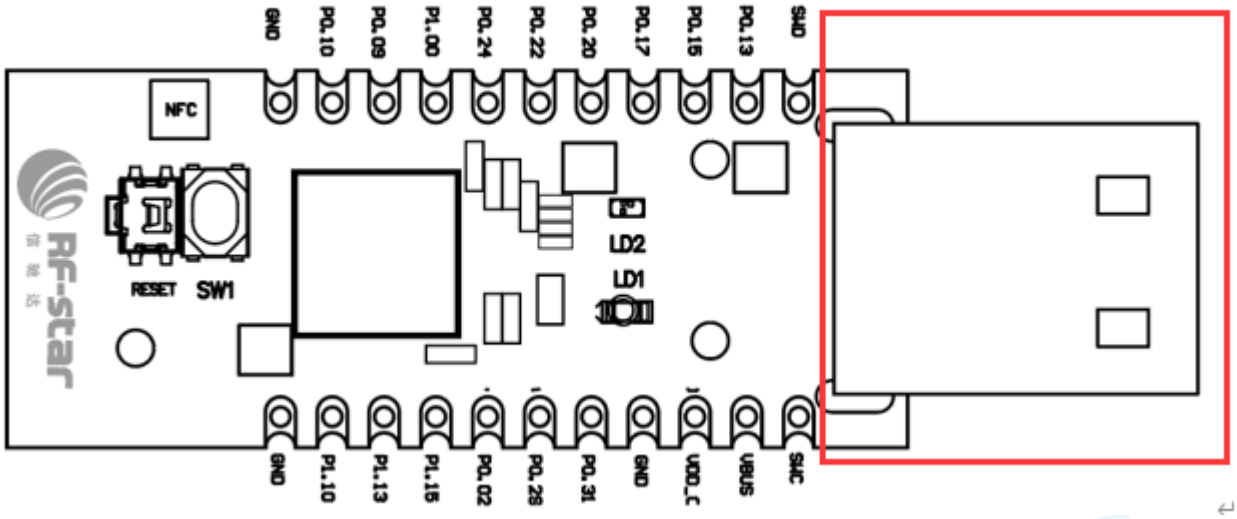


Figure 7. USB Port

2.6 External Connections

The nRF52840 Dongle has 15 GPIOs in addition to the ground, power, and SWD connections along the castellated edges.

The castellated edge holes have a pitch of 0.1 inches (2.54 mm) and a row spacing of 0.6 inches (15.24 mm)[2], making it suitable for stripboard connection. Test points for additional nine GPIOs are available on the backside of the circuit board, leaving a total of 24 GPIOs accessible.

Note: There is no reverse voltage protection on the power connections.

The SWD connections are located 0.2 inches (5.08 mm) away from the GPIOs with a row spacing of 0.4 inches (10.16 mm)

3 nRF Connect for Desktop (PC Tool)

3.1 Minimum Requirements

Before you start, check that you have the required hardware and software.

Hardware requirements

- PC with a standard type-A USB port
- RF-DG-40A

Software requirements

- nRF Connect for Desktop

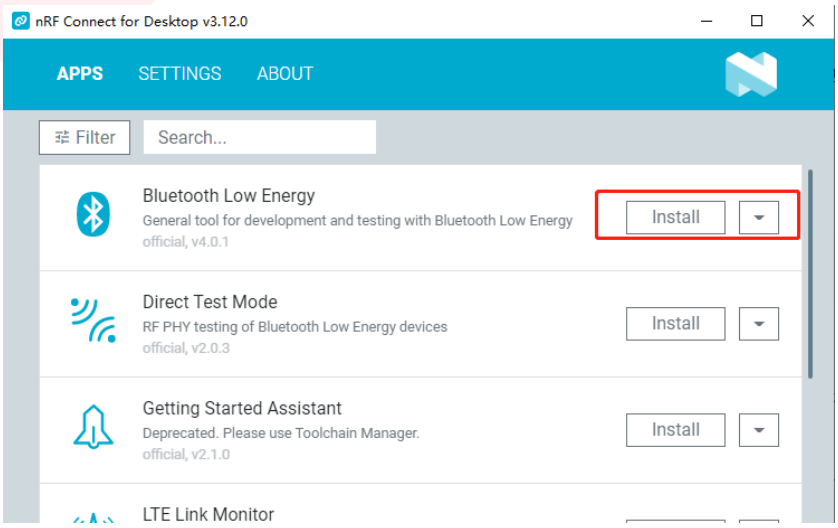
  Download address:

  https://www.nordicsemi.com/Software-and-tools/Development-Tools/nRF-Connect-for-desktop/Download#infotabs
- Operating system: macOS, Linux, or Windows 7 or later

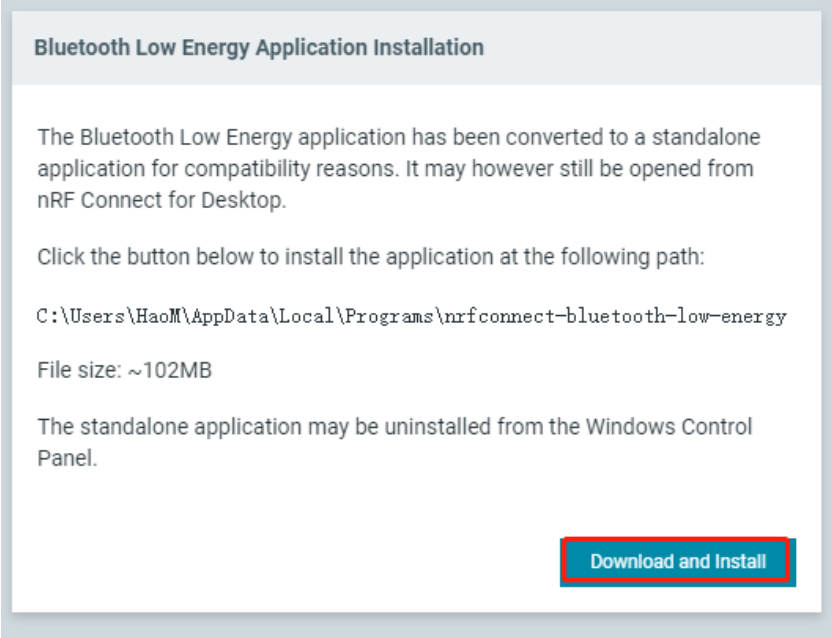
3.2 Build a Connection

Connect the Dongle RF-DG-40A to a computer and get started with nRF Connect for Desktop.

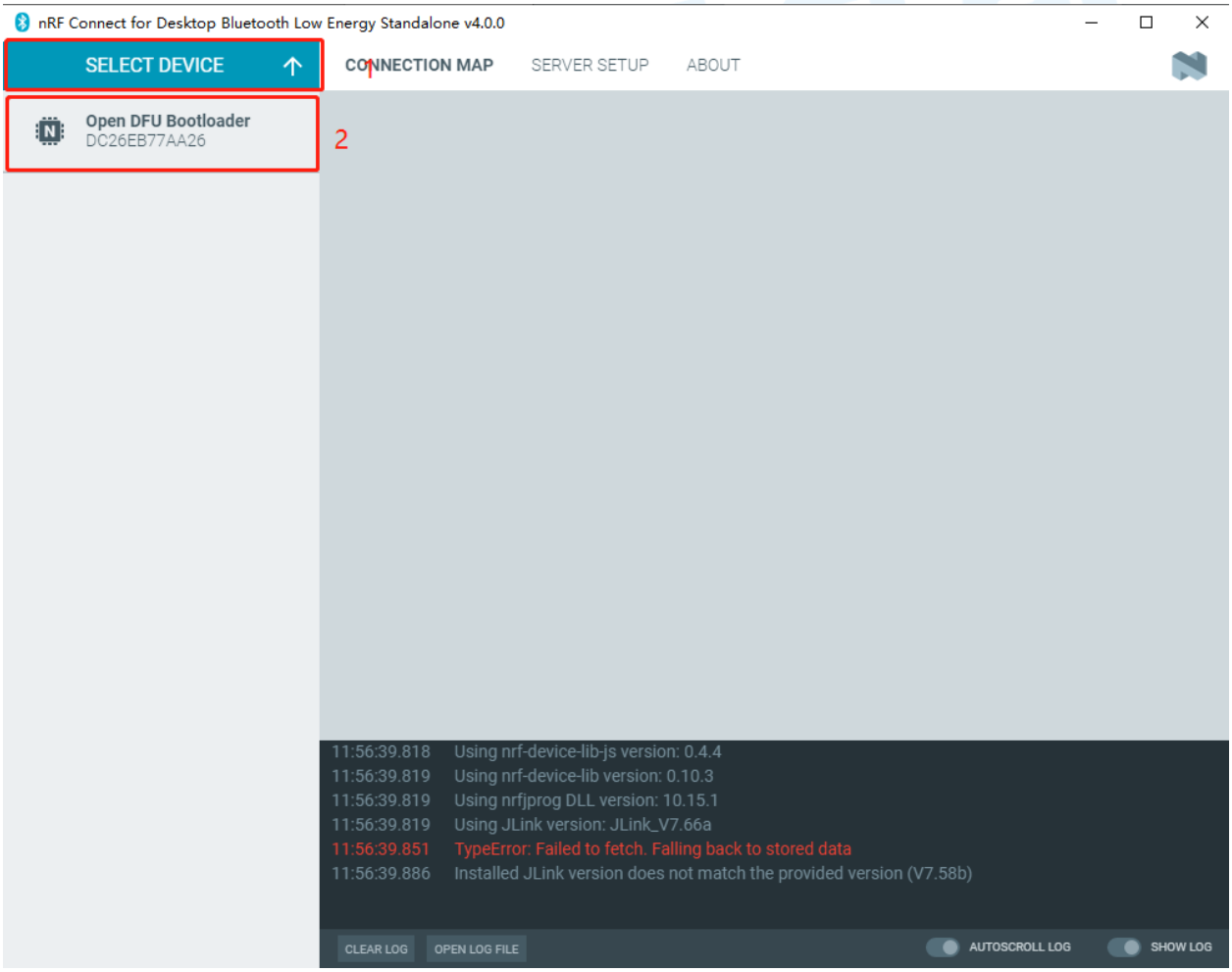
1. Download and install nRF Connect for Desktop.
2. Insert the nRF52840 Dongle into a USB port on your computer.
3. Open nRF Connect for Desktop, and choose Bluetooth Low Energy. If there is no Open choice, you need to install, see as follows. If there is Open, just click.



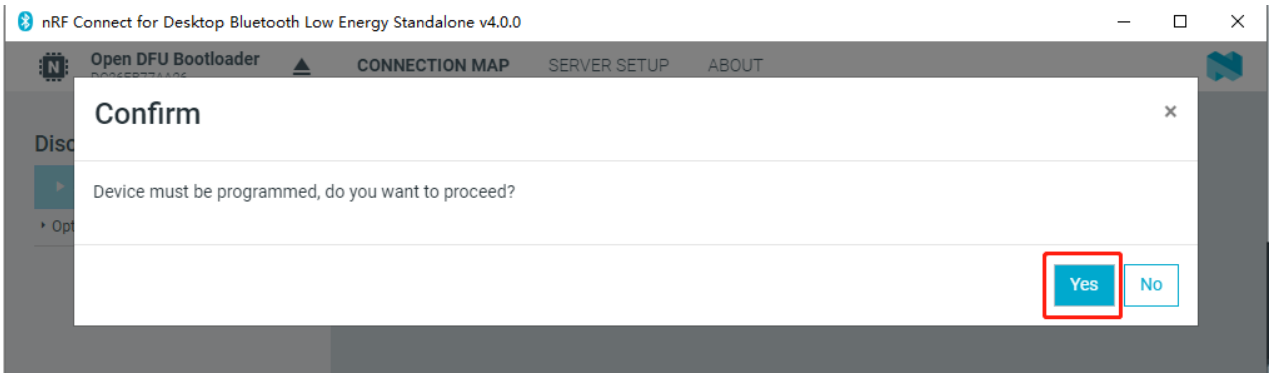
4. After installation, wait a moment, and click Download and Install as follows:



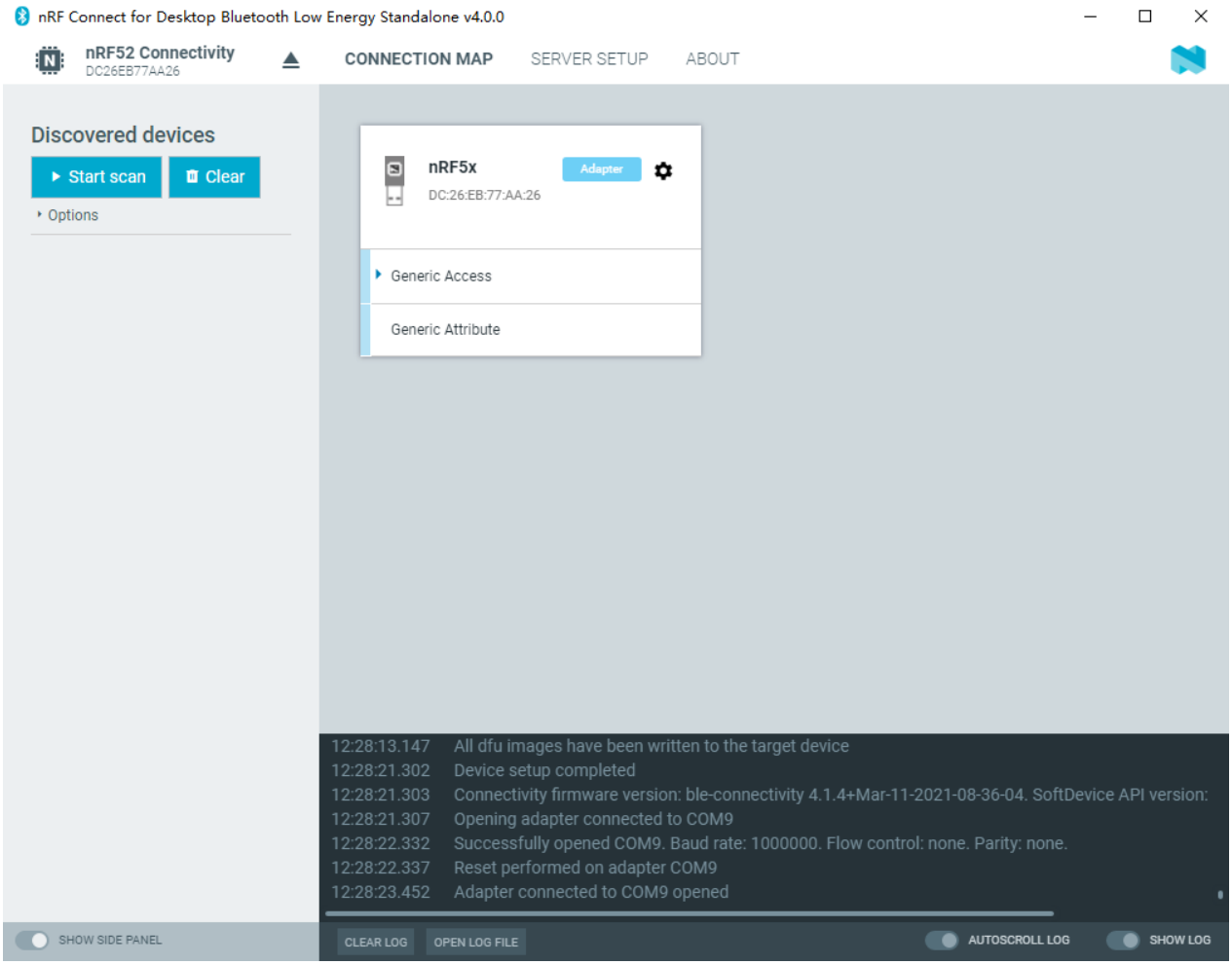
5. Press the RST button on RF-DG-40A to enter DFU mode, click Selcet Device, and choose the Open DFU Bootloader.



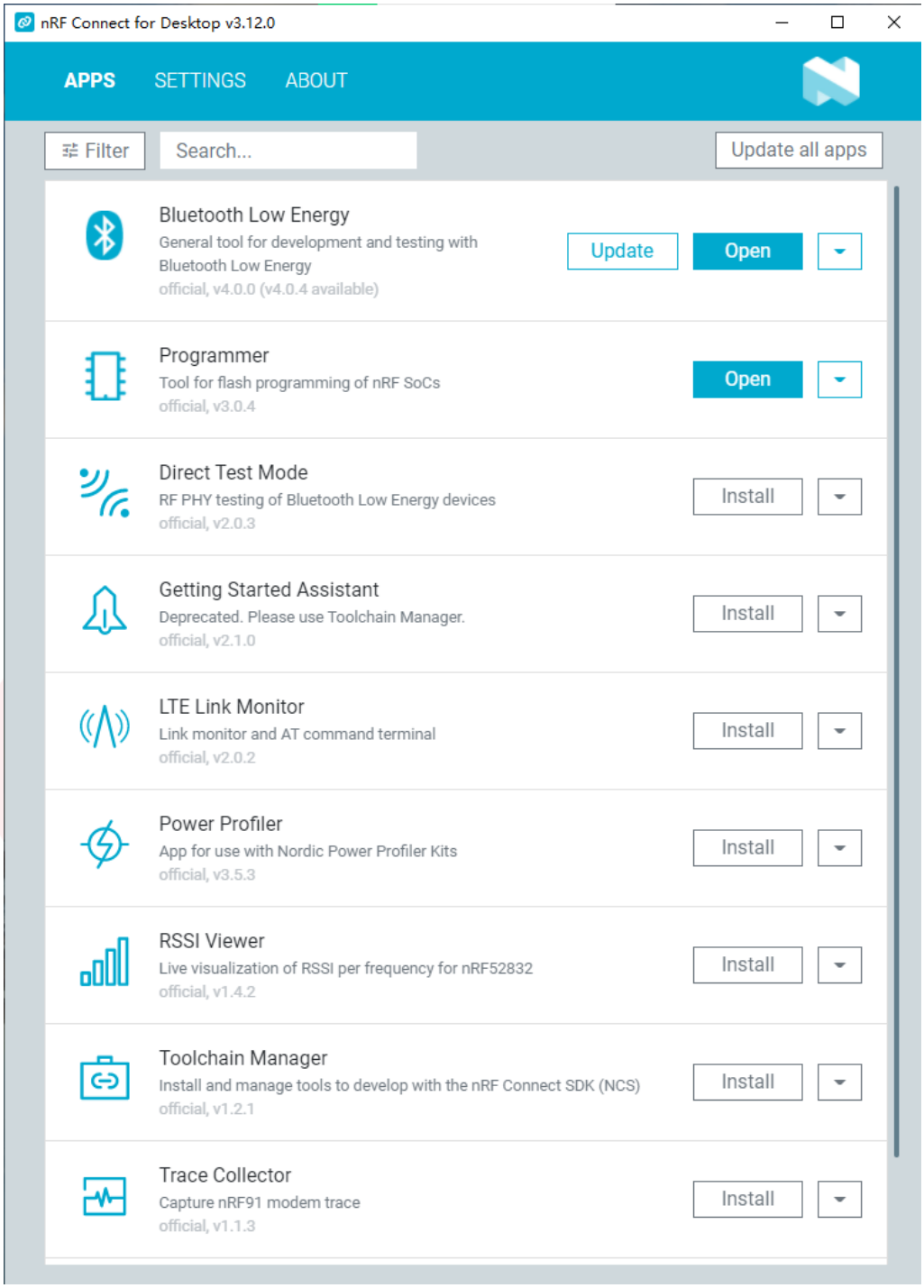
6. After choose Open DFU Bootloader, there is a window shows as follows. Click Yes, the dongle will enter auto-programming, just wait.



7. After the installation is finished, the following window shows up. Then you are successful of the above step. If not, pls repeat the steps from No. 5.

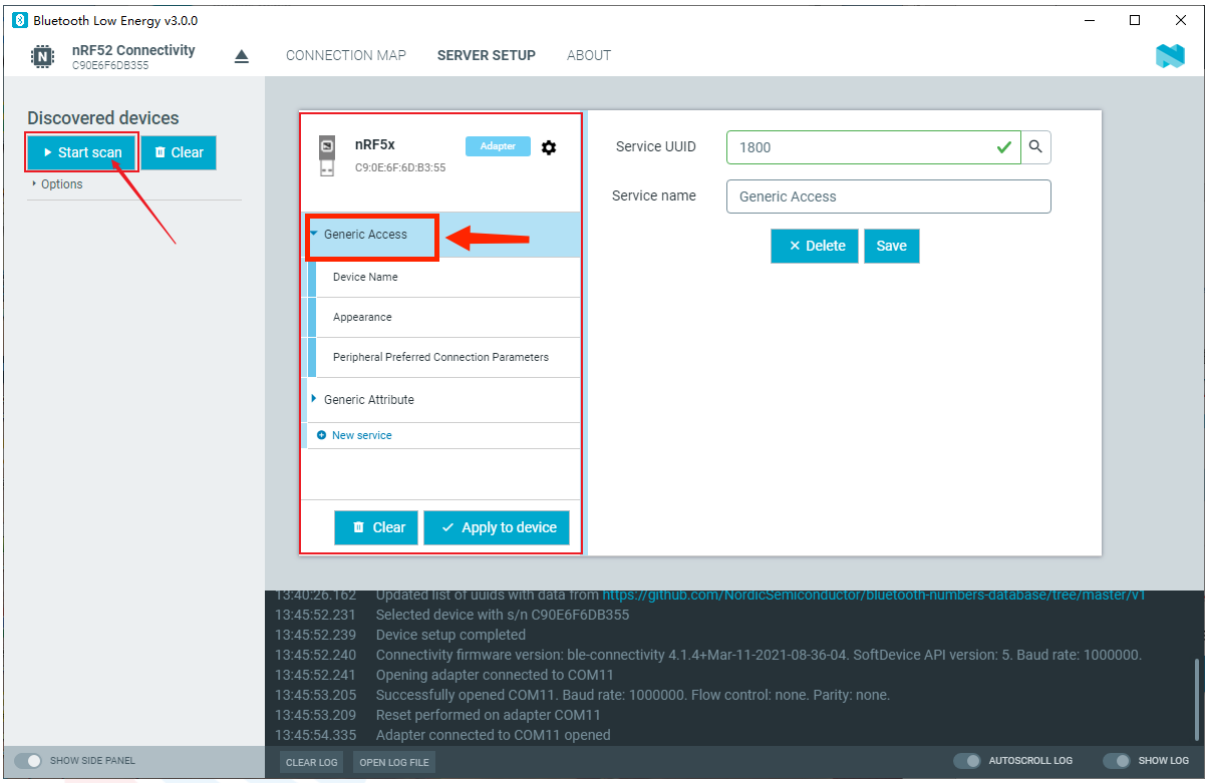


If you would like to choose the other programmers, such as Direct Test Mode. The installation steps are the same, follow the instruction from step 1~7.

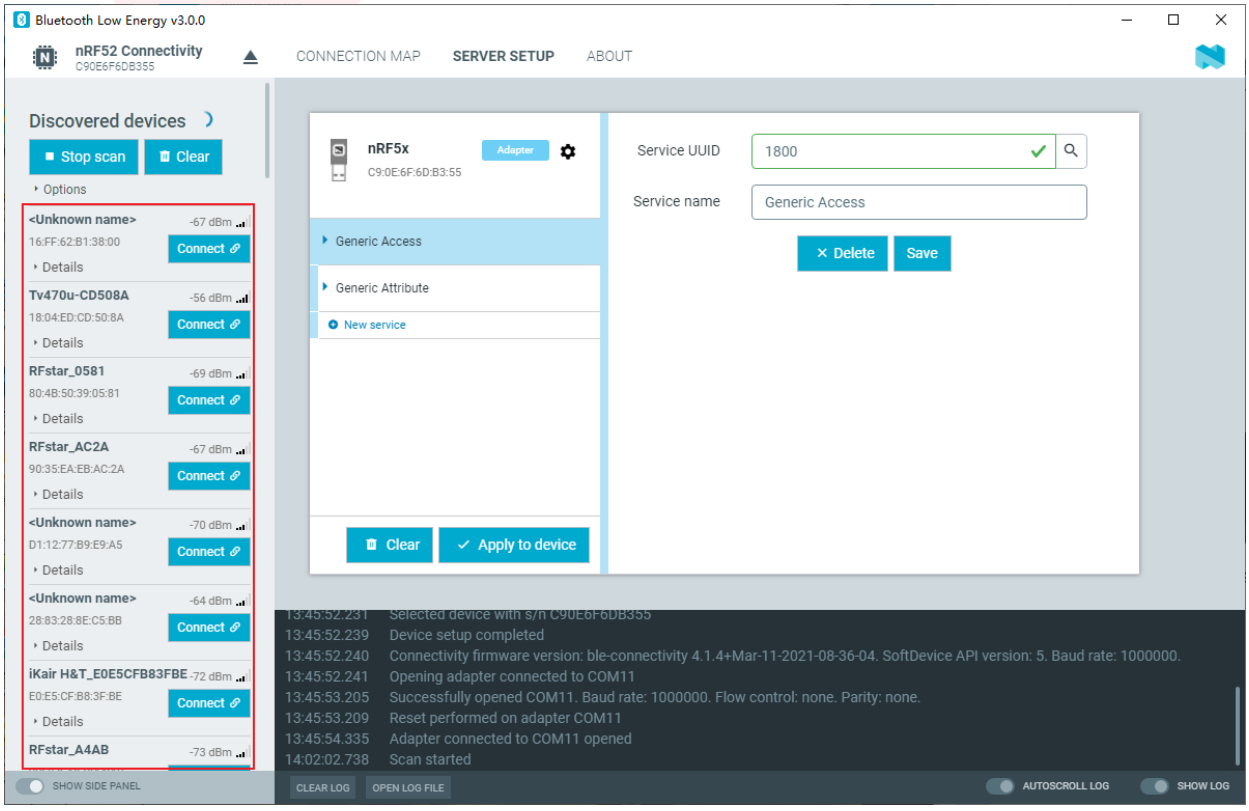


3.2 Connection Specifications

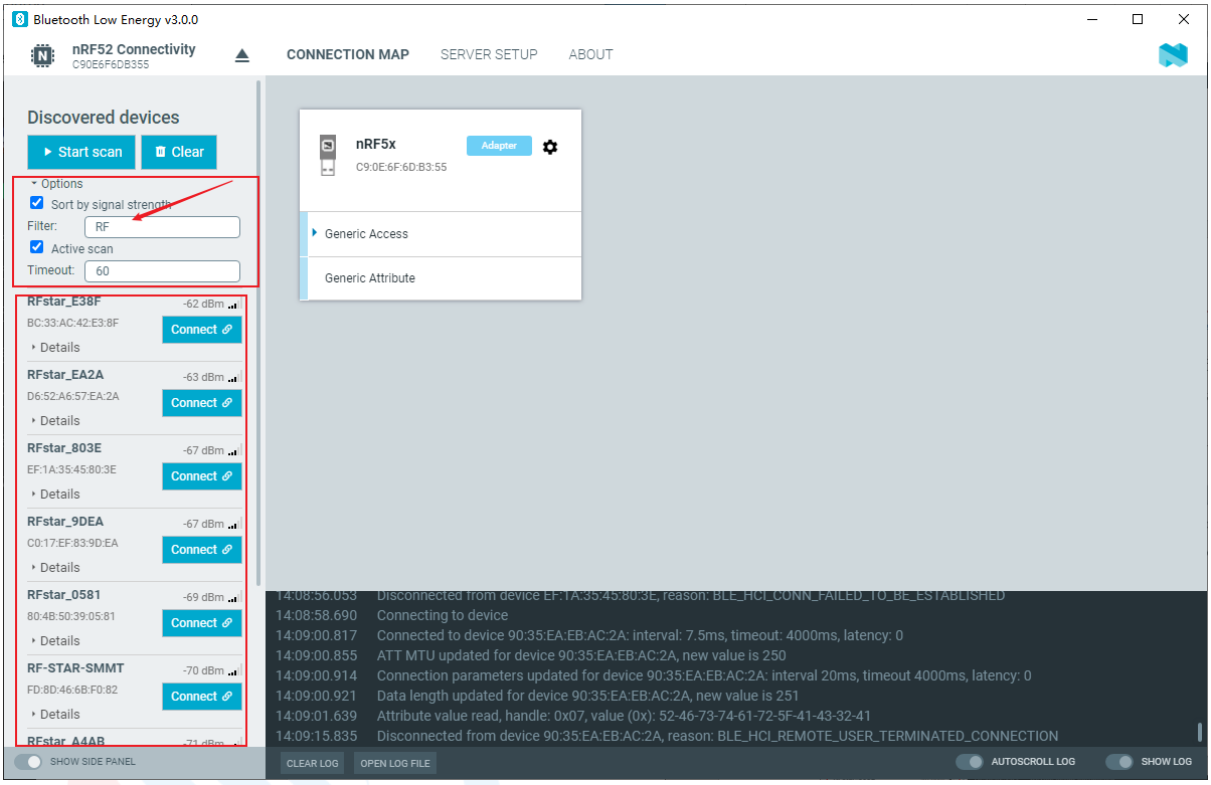
1. After the installation is finshed, the following window shows up. Click Generic Access to check the related info when the device is a master. Then click Start scan, the BLE devices can be scanned.



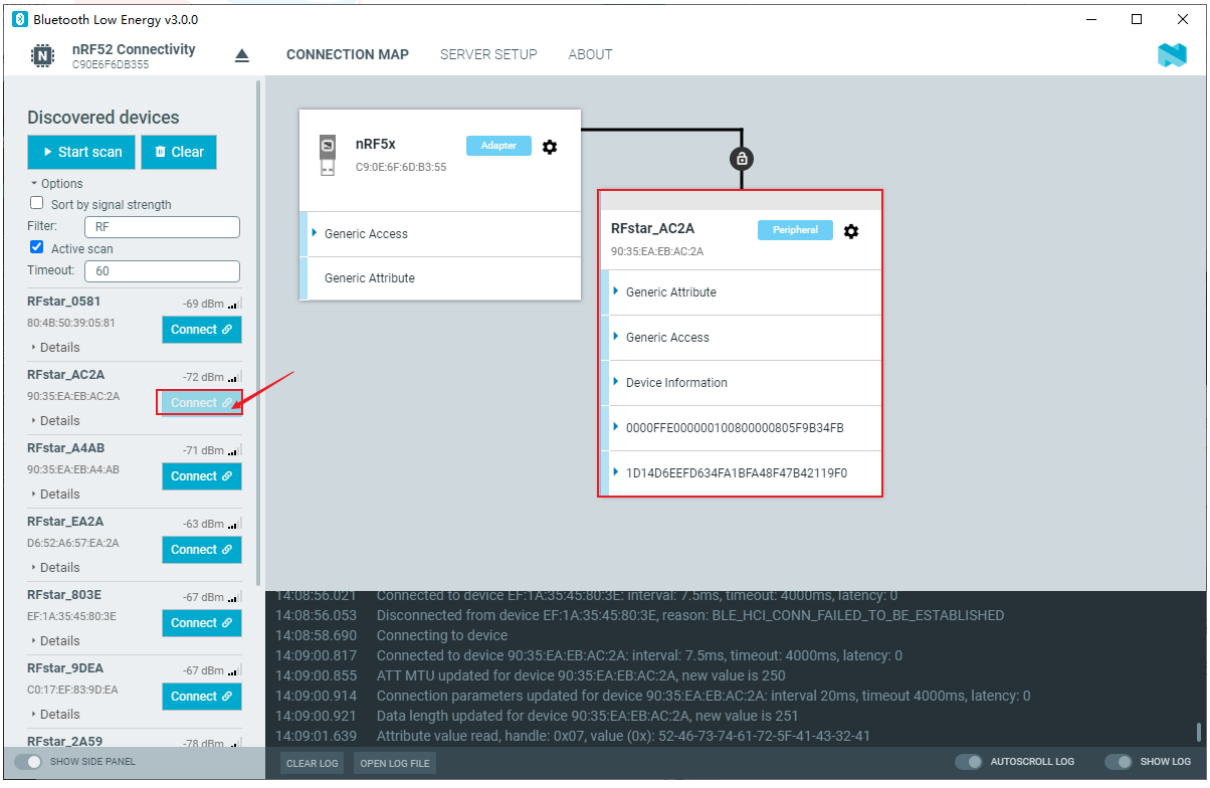
2. The scanned devices will show in the left window, while the old version shows in the right window.



3. If there are too many devices to find a specific device, you can click the small triangle of Option and enter the device name or MAC address in the filter box to filter the redundant devices. Check "Sort by signal strength" to select whether the signals are arranged in descending order from strong to weak.

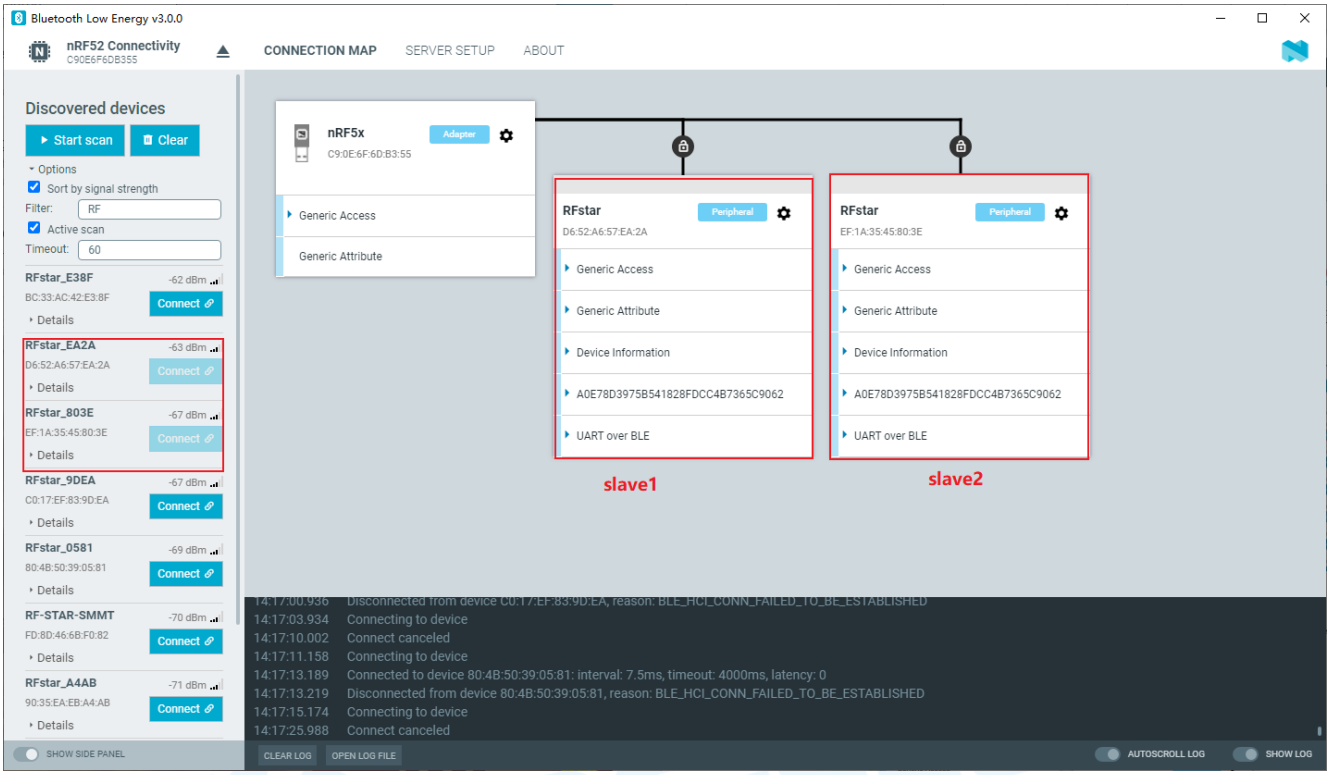


4. Click Connect to specify the slave, and the interface is as follows:



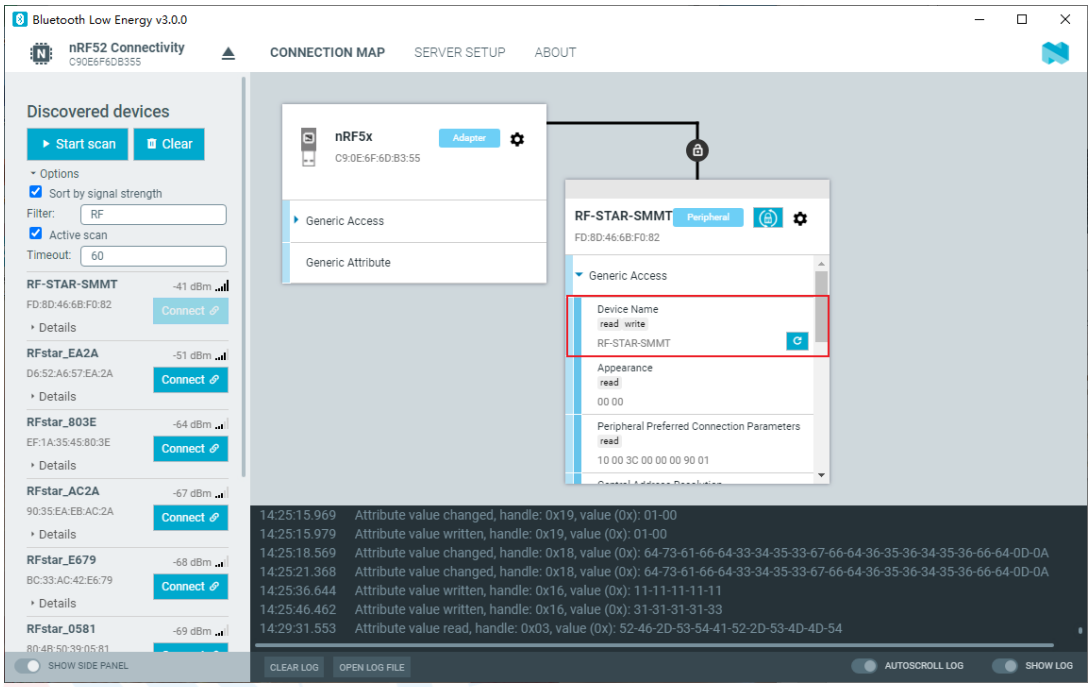
5. Multi connection operation: just click Connect in the scan window on the right (without disconnecting the

currently connected device), you can connect multiple slaves.

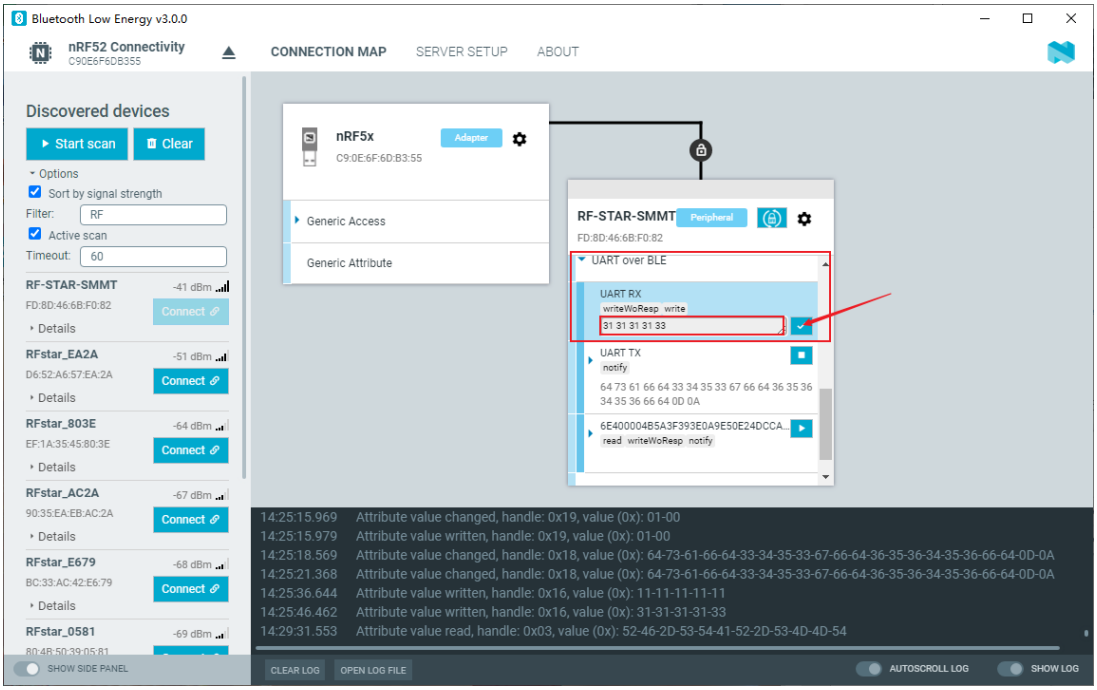


3.2 Read and Write Specifications

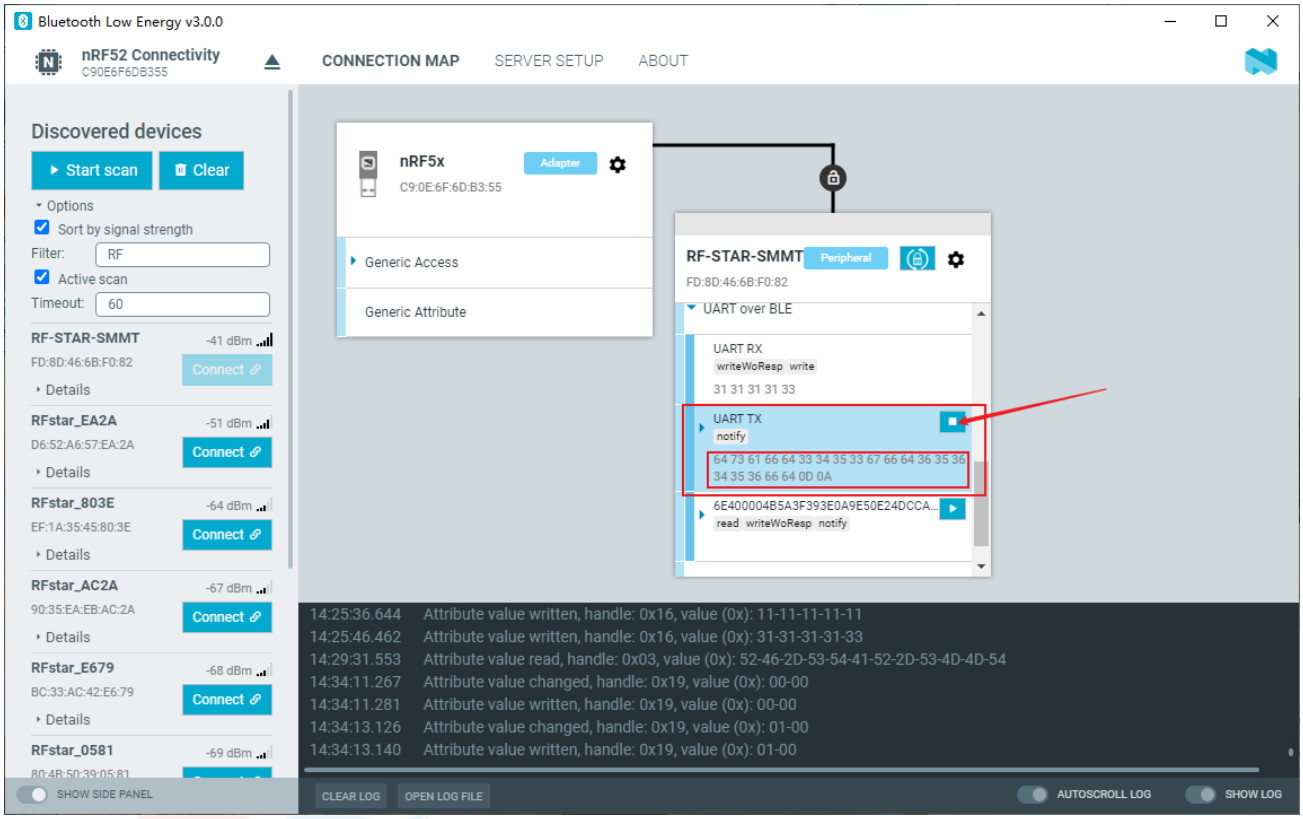
1. Device read operation. For example, to read the Device Name channel of the Generic Access service, you only need to click the arrow to complete the reading, provided that the characteristic value of the service has a read attribute.



2. Device write operation. For example, to write UART RX channel of UART over BLE service, just fill in the data in the box in the figure and click the button indicated by the arrow, provided that the characteristic value of the service has write attribute.



3. Receive a notify message. For example, to receive the notify notification of UART over TX service from UART TX channel, you need to click the button indicated by the arrow to receive the message of the channel, provided that the characteristic value of the service has the notify attribute.



4 Capture Data Packets of BLE Sniffer

4.1 Minimum Requirements

Before you start, check that you have the required hardware and software.

Hardware requirements

- PC with a standard type-A USB port
- RF-DG-40A

Software requirements

- Download the Wireshark 2.4.5 and above version

  Wireshark download address: https://www.wireshark.org/#download
- Install the python v3.7.0 and above version

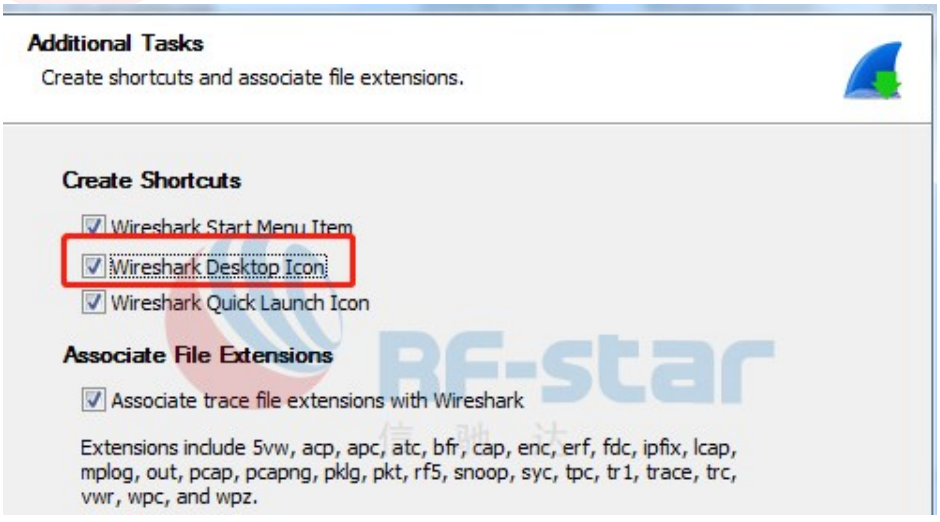
  Python v3.7.x environment download address: https://www.python.org/downloads/release/python-378/
- Download nRF Sniffer for Bluetooth LE v3.x.x environment

  Download address: https://www.nordicsemi.com/Software-and-tools/Development-Tools/nRF-Sniffer-for-Bluetooth-LE/Download#infotabs
- Operating system: macOS, Linux, or Windows 7 or later

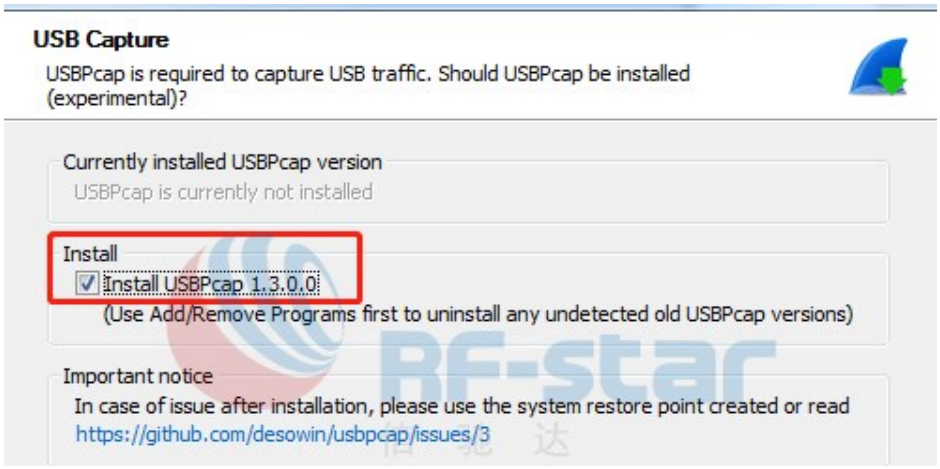
4.2 Software Preparation

Pay attention to the following items when installing Wireshark

1. Click "Wireshark Desktop Icon".



2. Click "USBPcap" and install.



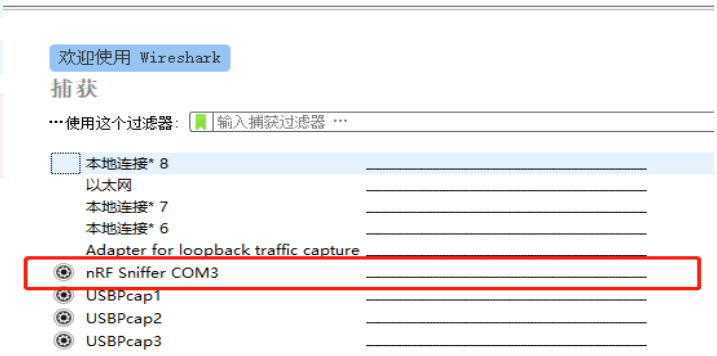
3. Python 2.7 and above development environment. Python 3.7 version is used here.

   Click "next" at each step when installing python

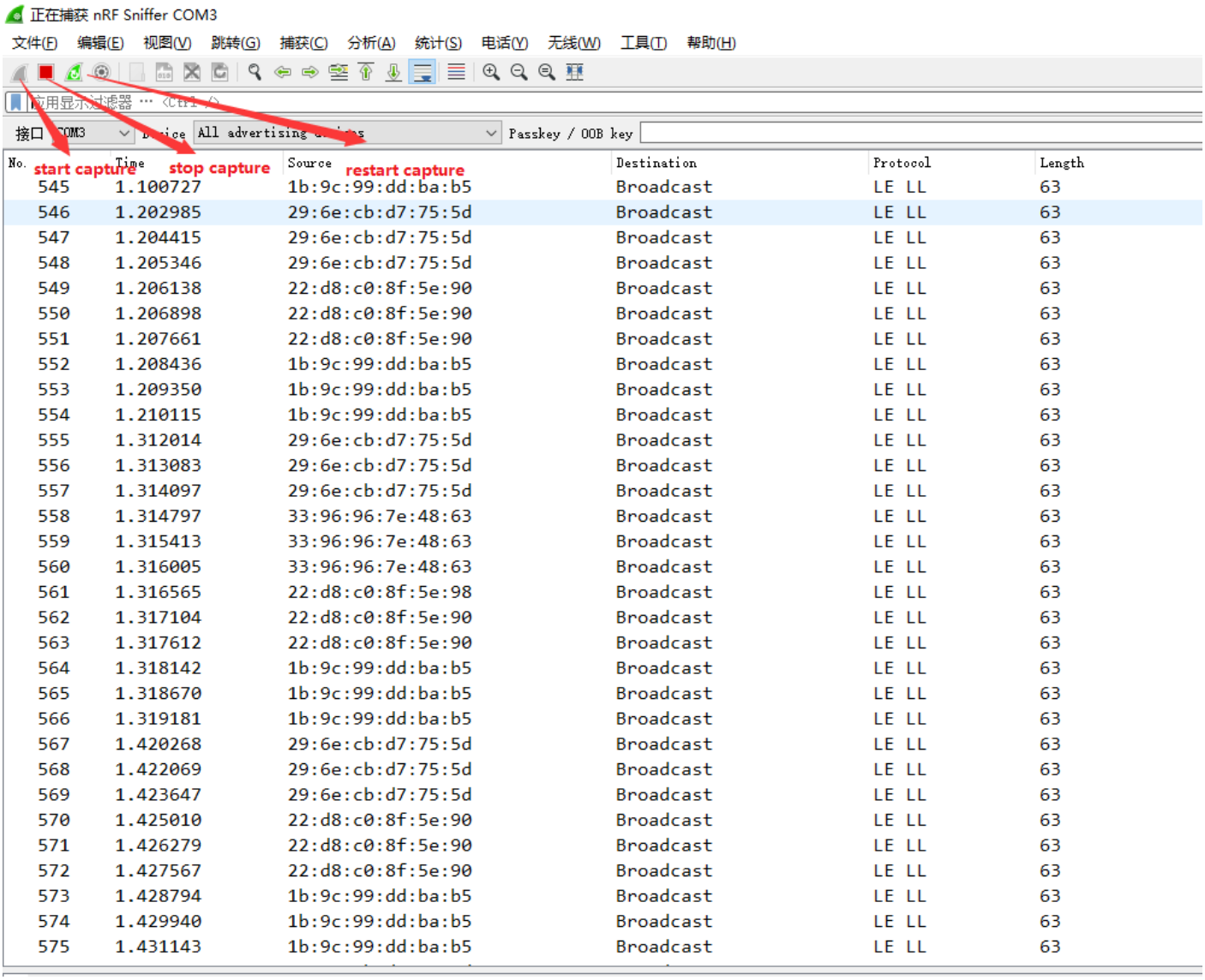
4. Refer to the Chapter 3 for Preparation for Development Environment in “20220523 RF-DG-32B User Guide V1.2”.

4.3 Instruction for Use

1. After the software is successfully installed, connect the RF-DG-40A to the PC via USB, open Wireshark, and select nRF Sniffer COMx.



2. Select -> View -> Interface Toolbar -> nRF Sniffer in the toolbar, the following interface will appear (by default, all BLE broadcast signals are captured).

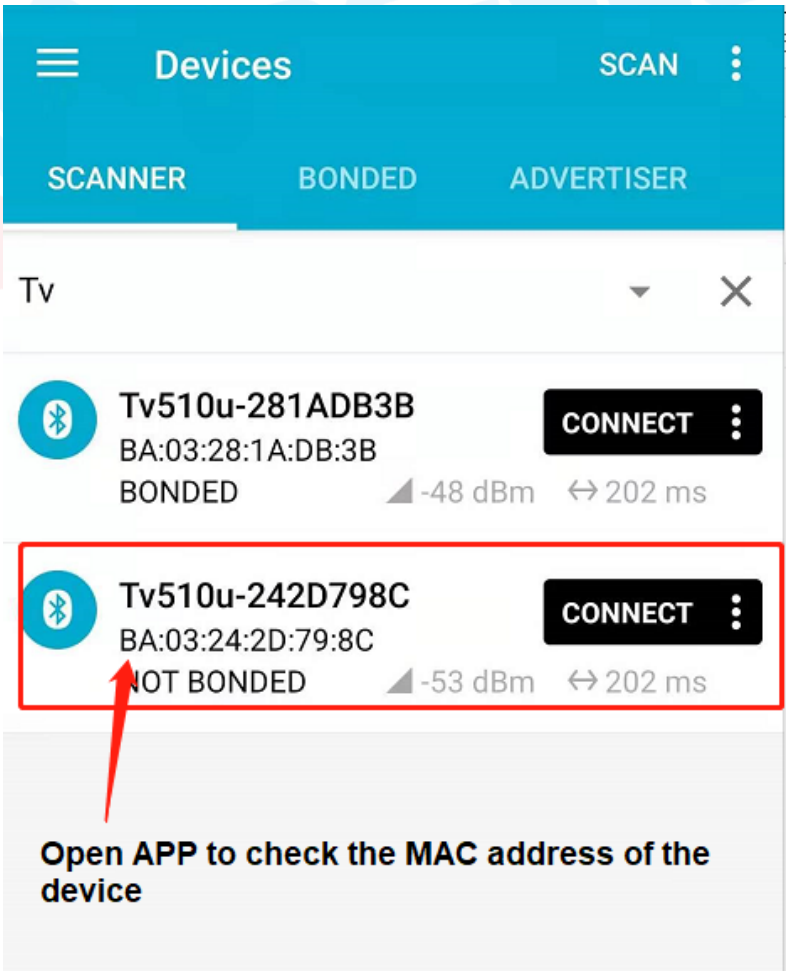


No.	Time	Source	Destination	Protocol	Length
545	1.100727	1b:9c:99:dd:ba:b5	Broadcast	LE LL	63
546	1.202985	29:6e:cb:d7:75:5d	Broadcast	LE LL	63
547	1.204415	29:6e:cb:d7:75:5d	Broadcast	LE LL	63
548	1.205346	29:6e:cb:d7:75:5d	Broadcast	LE LL	63
549	1.206138	22:d8:c0:8f:5e:90	Broadcast	LE LL	63
550	1.206898	22:d8:c0:8f:5e:90	Broadcast	LE LL	63
551	1.207661	22:d8:c0:8f:5e:90	Broadcast	LE LL	63
552	1.208436	1b:9c:99:dd:ba:b5	Broadcast	LE LL	63
553	1.209350	1b:9c:99:dd:ba:b5	Broadcast	LE LL	63
554	1.210115	1b:9c:99:dd:ba:b5	Broadcast	LE LL	63
555	1.312014	29:6e:cb:d7:75:5d	Broadcast	LE LL	63
556	1.313083	29:6e:cb:d7:75:5d	Broadcast	LE LL	63
557	1.314097	29:6e:cb:d7:75:5d	Broadcast	LE LL	63
558	1.314797	33:96:96:7e:48:63	Broadcast	LE LL	63
559	1.315413	33:96:96:7e:48:63	Broadcast	LE LL	63
560	1.316005	33:96:96:7e:48:63	Broadcast	LE LL	63
561	1.316565	22:d8:c0:8f:5e:98	Broadcast	LE LL	63
562	1.317104	22:d8:c0:8f:5e:90	Broadcast	LE LL	63
563	1.317612	22:d8:c0:8f:5e:90	Broadcast	LE LL	63
564	1.318142	1b:9c:99:dd:ba:b5	Broadcast	LE LL	63
565	1.318670	1b:9c:99:dd:ba:b5	Broadcast	LE LL	63
566	1.319181	1b:9c:99:dd:ba:b5	Broadcast	LE LL	63
567	1.420268	29:6e:cb:d7:75:5d	Broadcast	LE LL	63
568	1.422069	29:6e:cb:d7:75:5d	Broadcast	LE LL	63
569	1.423647	29:6e:cb:d7:75:5d	Broadcast	LE LL	63
570	1.425010	22:d8:c0:8f:5e:90	Broadcast	LE LL	63
571	1.426279	22:d8:c0:8f:5e:90	Broadcast	LE LL	63
572	1.427567	22:d8:c0:8f:5e:90	Broadcast	LE LL	63
573	1.428794	1b:9c:99:dd:ba:b5	Broadcast	LE LL	63
574	1.429940	1b:9c:99:dd:ba:b5	Broadcast	LE LL	63
575	1.431143	1b:9c:99:dd:ba:b5	Broadcast	LE LL	63

3. Select any RF-star BLE slave development board to power on for broadcasting.

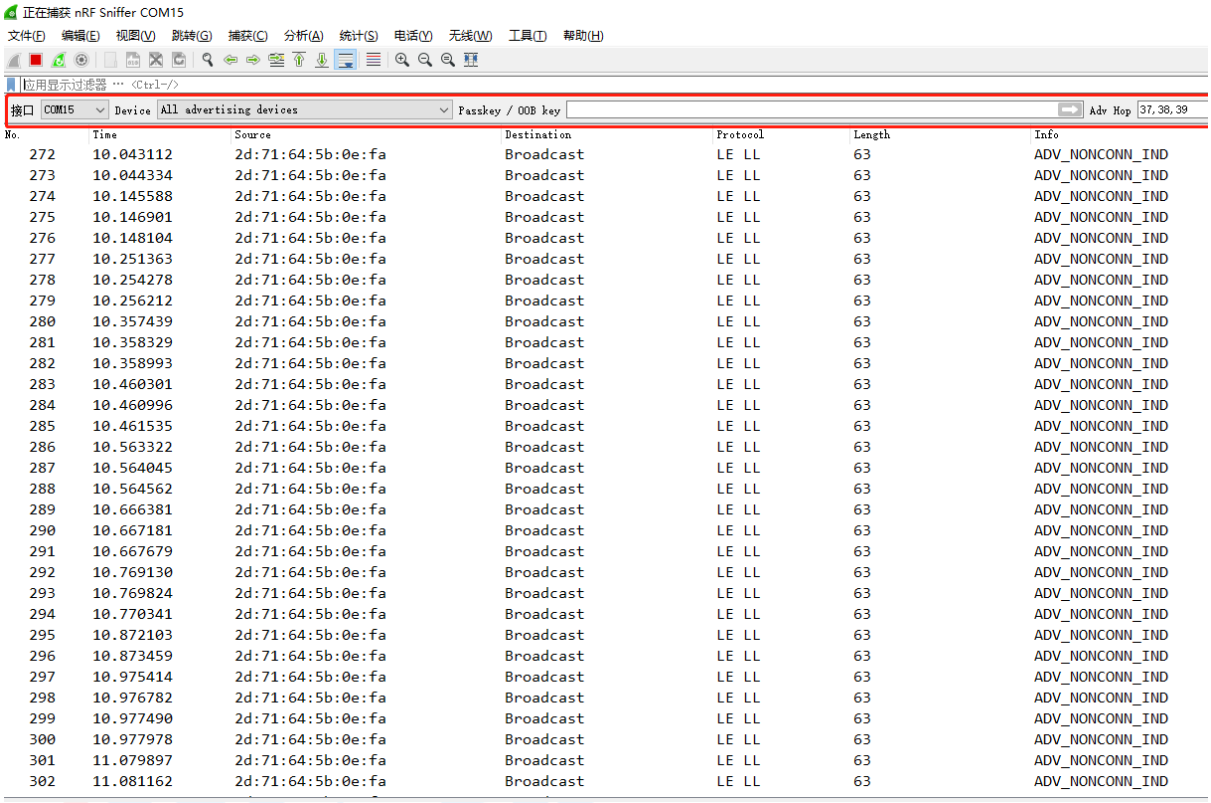
4. Capture the data packets of the specified MAC address device.

   You can check the device's MAC address through the APP, as shown below:



   As shown in the red box in the figure below, click the device filter drop-down box to select the device with the

corresponding MAC address. After selecting the fixed device, only the data packets related to the device will be captured.



No.	Time	Source	Destination	Protocol	Length	Info
272	10.043112	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
273	10.044334	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
274	10.145588	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
275	10.146901	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
276	10.148104	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
277	10.251363	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
278	10.254278	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
279	10.256212	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
280	10.357439	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
281	10.358329	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
282	10.358993	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
283	10.460301	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
284	10.460996	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
285	10.461535	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
286	10.563322	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
287	10.564045	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
288	10.564562	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
289	10.666381	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
290	10.667181	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
291	10.667679	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
292	10.769130	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
293	10.769824	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
294	10.770341	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
295	10.872103	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
296	10.873459	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
297	10.975414	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
298	10.976782	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
299	10.977490	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
300	10.977978	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
301	11.079897	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND
302	11.081162	2d:71:64:5b:0e:fa	Broadcast	LE LL	63	ADV_NONCONN_IND

5. After Wireshark selects the MAC address device, the broadcast packet, scan request packet and scan response packet of the device will be captured.

No.	Time	Source	Destination	Protocol	Length	Info
10094	458.592234	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10095	458.593469	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10096	458.795753	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10097	458.797325	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10098	458.798505	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10099	459.000875	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10100	459.002667	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10101	459.003979	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10102	459.206072	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10103	459.207238	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10104	459.208045	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10105	459.208734	46:1c:9d:dd:3b:58	ba:03:24:2d:79:8c	LE LL	38	SCAN_REQ
10106	459.209447	ba:03:24:2d:79:8c	Broadcast	LE LL	58	SCAN_RSP
10107	459.411627	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10108	459.413303	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10109	459.414699	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10110	459.617545	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10111	459.618539	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10112	459.619232	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10113	459.821226	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10114	459.822962	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10115	459.824387	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10116	460.026561	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10117	460.028202	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10118	460.029887	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10119	460.231604	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10120	460.232516	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10121	460.233123	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10122	460.434175	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND
10123	460.435742	ba:03:24:2d:79:8c	Broadcast	LE LL	59	ADV_IND

Scan request packet

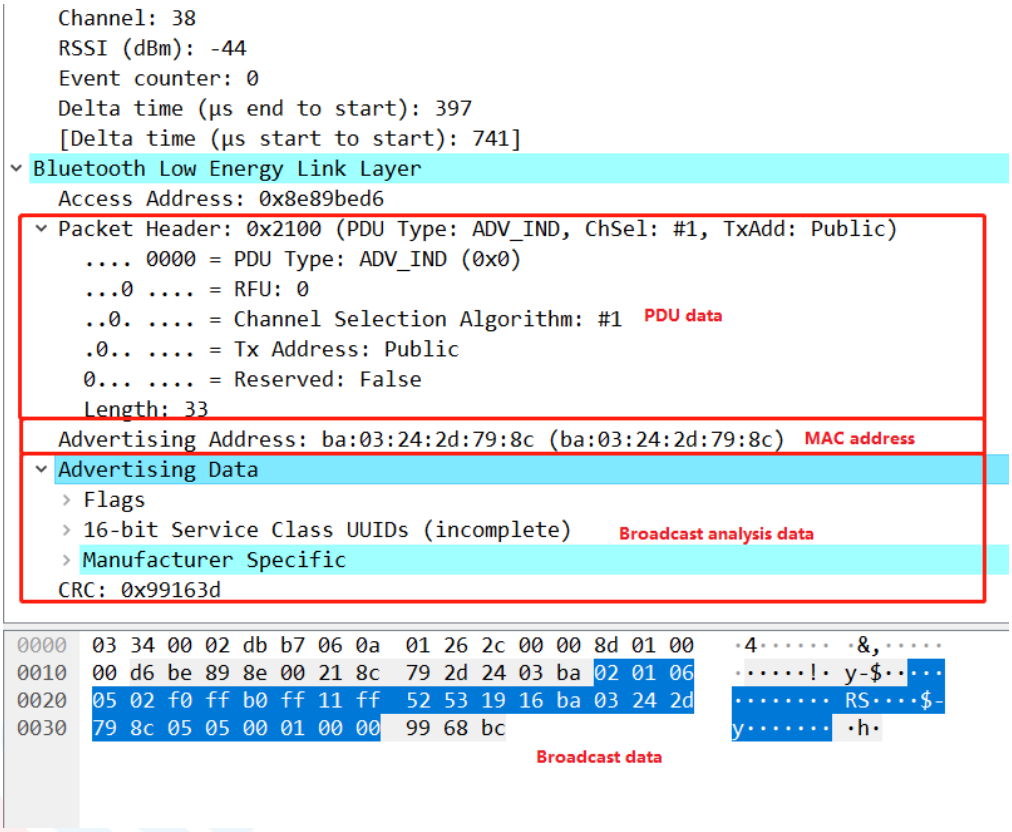
Scan Response packet

Broadcast packet

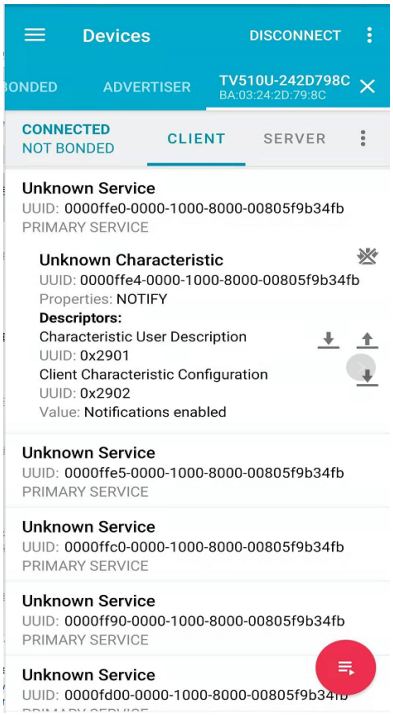
6. The data packets that the device communicates with any master can be captured, including the connection

process and the data packets after the connection.

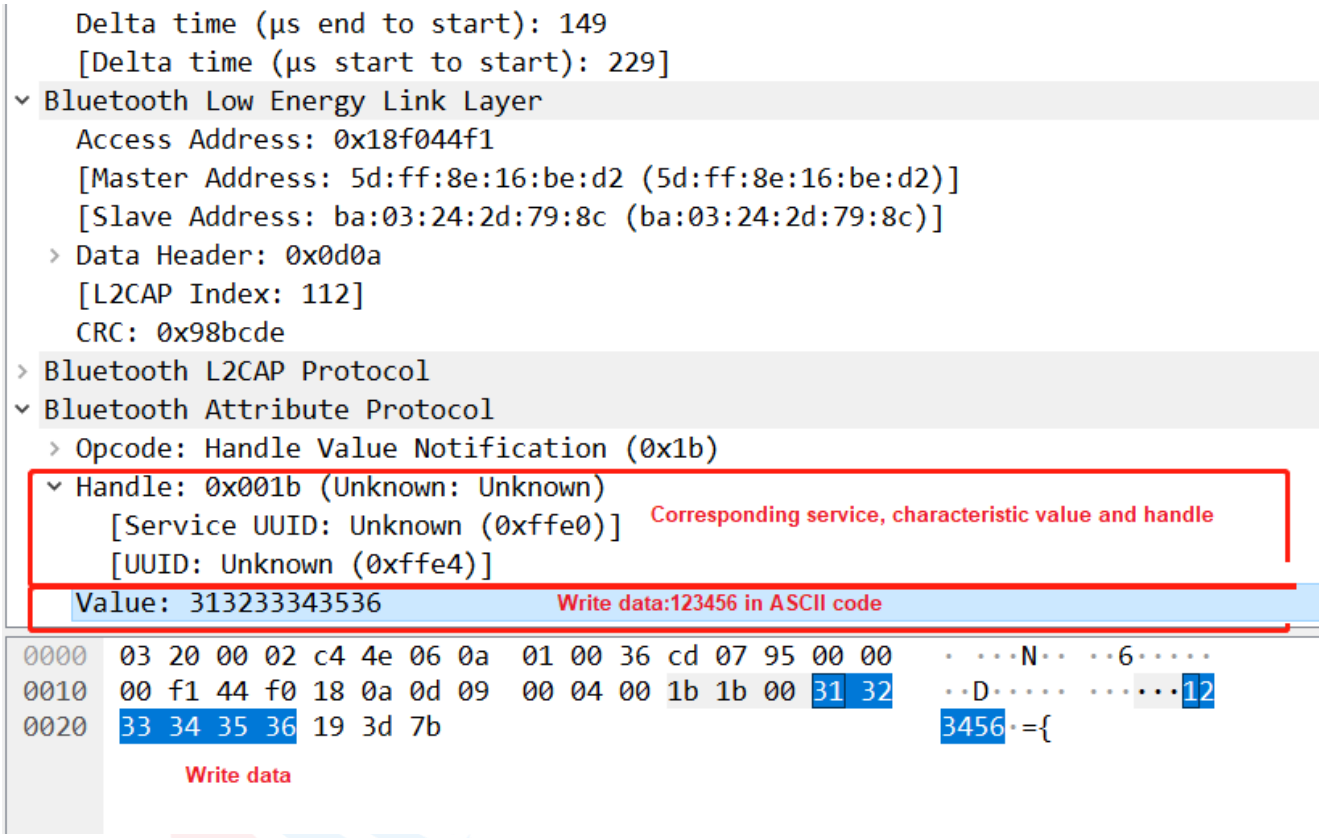
Double-click any packet to view the specific content. For example, the device captures the broadcast packet as follows:



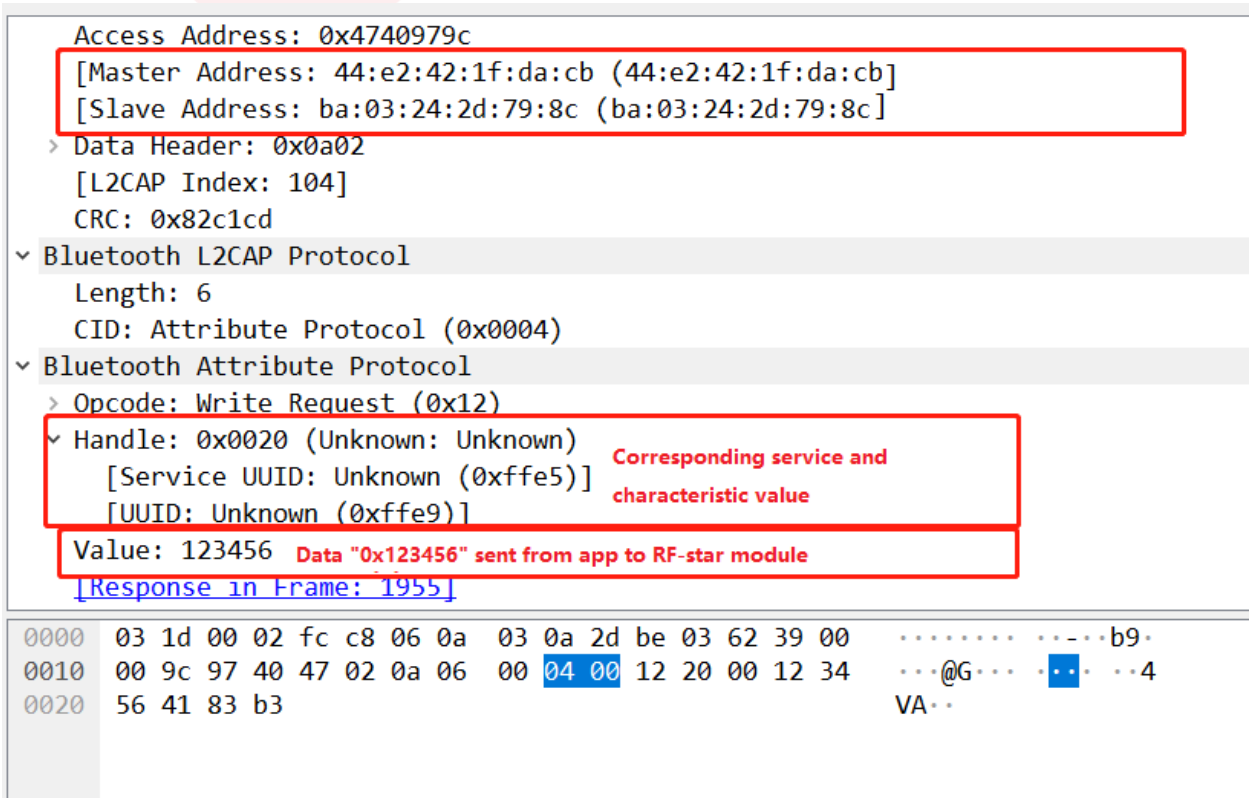
7. When a connection event occurs, all data communication processes of the connection process can be captured. After connecting the device, the APP interface is displayed as follows:



Use the serial assistant to send the ASCII code “123456” to the BLE transparent transmission module. After receiving, the BLE module will forward the data to the APP. The data captured by Sniffer is the data sent by BLE to the APP, as shown in the following figure:



Similarly, we can capture the data packets sent by the APP to the BLE module. The data captured by Sniffer after



5 Capture Data Packets of ZigBee Sniffer

5.1 Minimum Requirements

Before you start, check that you have the required hardware and software.

Hardware requirements

- PC with a standard type-A USB port
- RF-DG-40A

Software requirements

- Official ZigBee Sniffer firmware
  Download address: https://github.com/NordicSemiconductor/nRF-Sniffer-for-802.15.4
- Wireshark 2.4.5 and above version
  Download address: https://www.wireshark.org/#download
- Operating system: macOS, Linux, or Windows 7 or later

5.2 Software Preparation

Pls refer to Chapter 4.2.

5.3 Environment Setup

5.3.1 Configure Wireshark Environment

1. Open Wireshark -> help -> about Wireshark -> folder -> double-click to open extcap path, as shown in the figure below:

2. Unzip the nRF-Sniffer-for-802.15.4-master.zip file and copy the “nrf802154_sniffer.py” and “nrf802154_sniffer.bat”

files in the nrf802154_sniffer folder to the Wireshark extcap path just opened. As shown in the figure below:

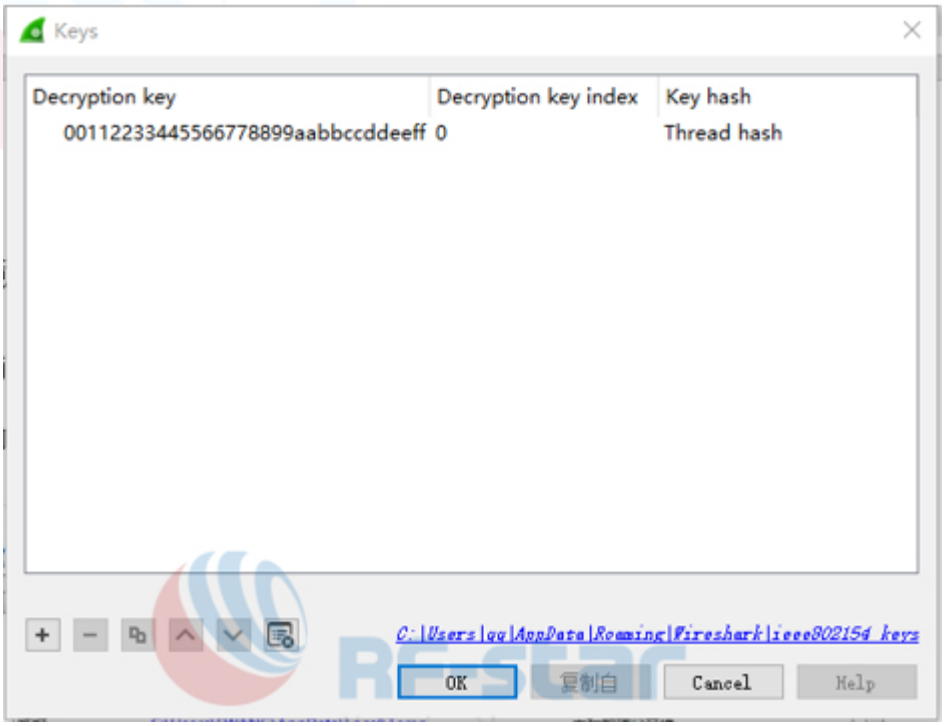
No matter how complicated the environment is, the operation can work as long as there are two files.

3. Open wireshark to set the parameters, and click Ctrl + Shift + P to enter Wireshark preferences. Search Protocols -> IEEE 802.15.4, click Decryption Keys, and edit the decryption key to the following settings:

   “Decryption key”: 00112233445566778899 aabbccddeeff

   “Decryption key index”: 0

   “Key hash”: Thread hash



4. Search Protocols -> Thread

   “Thread sequence counter”: 00000000

   Click “Use PAN ID as first two octets of master key”

Click “Automatically acquire Thread sequence counter”, as shown in the figure below:

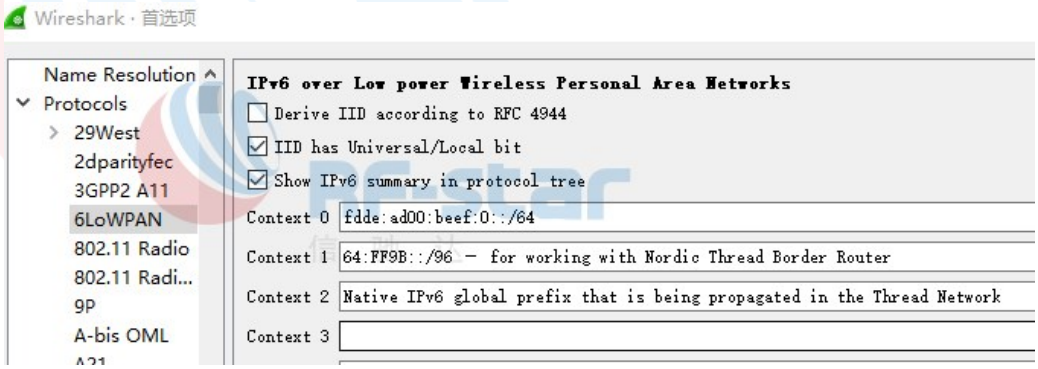
5. Search Protocols -> 6LoWPAN

Click “Derive ID according to RFC 4944”

“Context 0”: fdde:ad00:beef:0::/64

“Context 1”: 64:FF9B::/96 – for working with Nordic Thread Border Router

“Context 2”: Native IPv6 global prefix that is being propagated in the Thread Network.

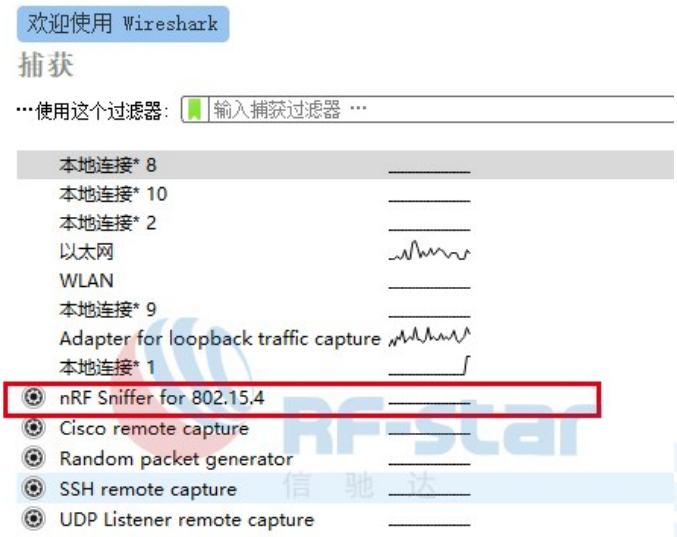


6. Search Protocols -> CoAP

“CoAP UDP port to”: 61631

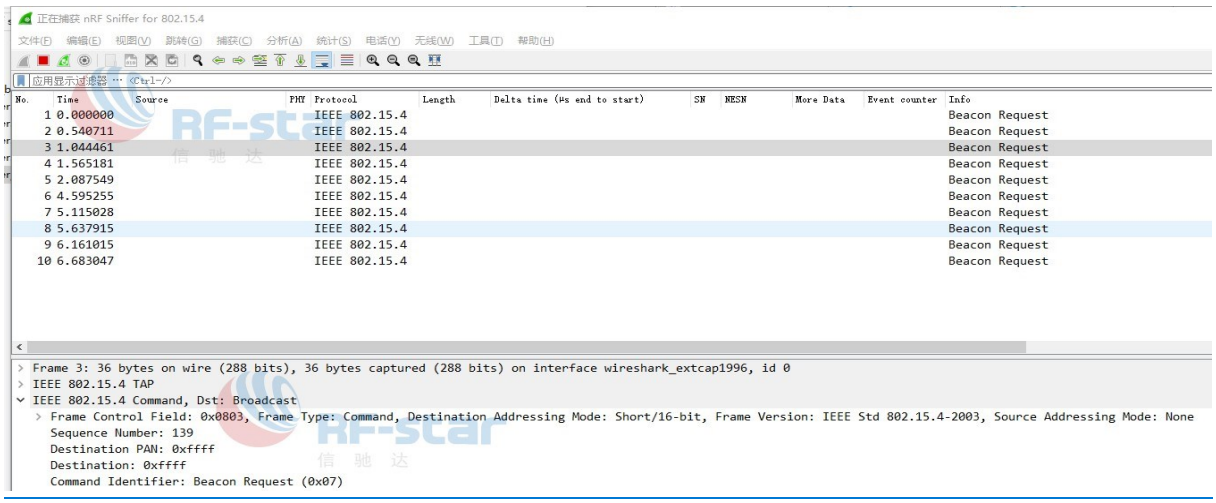
5.3.2 Specification for ZigBee Sniffer

1. Make sure that it is the firmware of ZigBee Sniffer in the module
2. Make sure that RF-DG-40A is working in the well-prepared environment
3. Then open wireshark, it will identify a nRF sniffer for 802.15.4 device.



4. Set the corresponding ZigBee channel.

5. Click start to grab the ZigBee communication package under the current channel.



6 Programming

The nRF52840 Dongle can be programmed through the built-in USB bootloader.

Before you start, check Getting started on page 3.

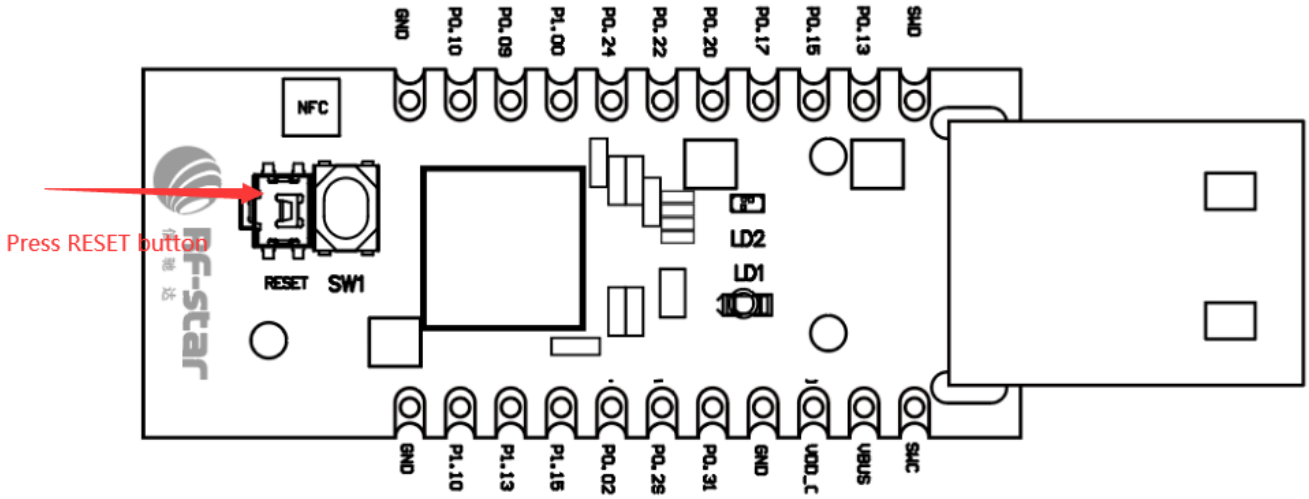
To program the Dongle, it must be in bootloader mode.

The Dongle can be made to enter bootloader mode in one of the two ways:

- Trigger the nRF52840 USB DFU endpoint.

The firmware to support this is embedded in all nRF Connect for Desktop apps for the nRF52840 Dongle. If you add the DFU Trigger Library (USB) to your custom device firmware, you will be able to trigger the DFU from nRF Connect for Desktop without using any buttons. For documentation, see DFU Trigger Library (USB), which is part of the nRF5 SDK v15.2.0.

- For Dongles with applications missing the USB DFU endpoint: Press the RESET button.



When the nRF52840 Dongle has entered the bootloader mode, LD2 pulses red. The Dongle is now ready for programming.

All the nRF Connect for Desktop apps require specific firmware to be present on the nRF52840 Dongle to function correctly. The apps will update the firmware if needed. If you want to upload custom firmware to the Dongle, you can do this by using the dedicated Programmer programming app, or nrfutil.

7 Electrostatics Discharge Warnings

The module will be damaged by the discharge of static. RF-star suggests that all modules should follow the 3 precautions below:

1. According to the anti-static measures, bare hands are not allowed to touch modules.
2. Modules must be placed in anti-static areas.
3. Take the anti-static circuitry (when inputting HV or VHF) into consideration in product design.
   Static may result in the degradation in performance of the module, even causing the failure.

8 Revision History

Date	Version No.	Description
2020.04.17	V0.1	The initial version is released.
2020.04.23	V1.0	Add SWD interface specification.
2020.09.17	V1.1	Add ZigBee Sniffer packet capture instructions. Update pin diagram.
2020.11.25	V1.1	Change the error description of the LED color when entering BootLoader.
2021.02.06	V1.2	Add BLE Sniffer function specification.
2023.05.26	V1.2	Update the Shenzhen office address.

Note:

1. The document will be optimized and updated from time to time. Before using this document, please make sure it is the latest version.
2. To obtain the latest document, please download it from the official website: www.rfstariot.com and www.szrfstar.com.

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