



LA66 USB Adapter V2

last modified by Mengting Qiu

on 2024/04/01 17:22

Table of Contents

1. LA66 USB Adapter V2	3
1.1 Overview	3
1.2 Features	4
1.3 Specification	4
1.4 Pin Mapping & LED	4
1.5 Example: Send & Get Messages via LoRaWAN in PC	5
1.6 Example: How to join helium	10
1.7 Example: Send PC's CPU/RAM usage to TTN via python	15
1.8 Example: Send & Get Messages via LoRaWAN in RPi	16
1.9 Example: Use of LA66 USB Adapter V2 and mobile APP	21
1.9.1 Hardware and Software Connection	21
1.9.2 Send data to TTNv3 and plot location info in Node-Red	26
1.10 Upgrade Firmware of LA66 USB Adapter V2	28
1.10.1 LA66V1 Update method	28
1.10.2 LA66V2 Update method	35
2. FAQ	35
2.1 How to Compile Source Code for LA66?	35
2.2 Where to find Peer-to-Peer firmware of LA66?	36
2.3 My device keeps showing invalid credentials, the device goes into low power mode	36
2.4 How to use external antenna via ipex connector?	36
3. Order Info	36
4. Reference	37
5. FCC Statement	37

Table of Contents:

- [1. LA66 USB Adapter V2](#)
 - [1.1 Overview](#)
 - [1.2 Features](#)
 - [1.3 Specification](#)
 - [1.4 Pin Mapping & LED](#)
 - [1.5 Example: Send & Get Messages via LoRaWAN in PC](#)
 - [1.6 Example: How to join helium](#)
 - [1.7 Example: Send PC's CPU/RAM usage to TTN via python](#)
 - [1.8 Example: Send & Get Messages via LoRaWAN in RPi](#)
 - [1.9 Example: Use of LA66 USB Adapter V2 and mobile APP](#)
 - [1.9.1 Hardware and Software Connection](#)
 - [1.9.2 Send data to TTNv3 and plot location info in Node-Red](#)
 - [1.10 Upgrade Firmware of LA66 USB Adapter V2](#)
 - [1.10.1 LA66V1 Update method](#)
 - [1.10.2 LA66V2 Update method](#)
- [2. FAQ](#)
 - [2.1 How to Compile Source Code for LA66?](#)
 - [2.2 Where to find Peer-to-Peer firmware of LA66?](#)
 - [2.3 My device keeps showing invalid credentials, the device goes into low power mode](#)
 - [2.4 How to use external antenna via ipex connector?](#)
- [3. Order Info](#)
- [4. Reference](#)
- [5. FCC Statement](#)

LA66 USB Adapter V2

Overview



LA66 USB Adapter V2 is designed to fast turn USB devices to support LoRaWAN wireless features. It combines a CP2102 USB TTL Chip and LA66 LoRaWAN module which can easy to add LoRaWAN wireless feature to PC / Mobile phone or an embedded device that has USB Interface.

LA66 is a ready-to-use module that includes the **LoRaWAN v1.0.3 protocol**. The LoRaWAN stack used in LA66 is used in more than 1 million LoRaWAN End Devices deployed world widely. This mature LoRaWAN stack greatly reduces the risk to make stable LoRaWAN Sensors to support different LoRaWAN servers and different countries' standards. External MCU can use AT command to call LA66 and start to transmit data via the LoRaWAN protocol.

Each LA66 module includes a **world-unique OTAA key** for LoRaWAN registration.

Besides the support of the LoRaWAN protocol, LA66 also supports **open-source peer-to-peer LoRa Protocol** for the none-LoRaWAN application.

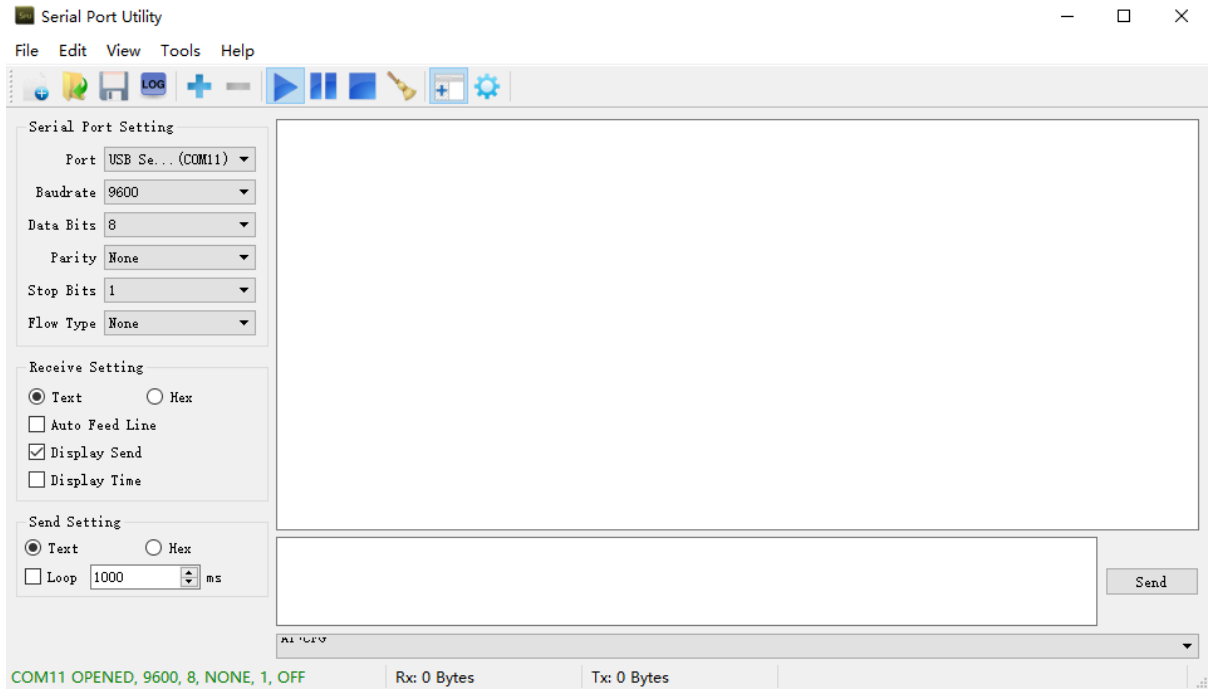
LA66 is equipped with **TCXO crystal** which ensures the module can achieve stable performance in extreme temperatures.

Features

- LoRaWAN USB adapter base on LA66 LoRaWAN module
- Ultra-long RF range
- Support LoRaWAN v1.0.3 protocol
- Support peer-to-peer protocol
- TCXO crystal to ensure RF performance on low temperature
- Spring RF antenna
- Available in different frequency LoRaWAN frequency bands.
- World-wide unique OTAA keys.
- AT Command via UART-TTL interface
- Firmware upgradable via UART interface
- Open Source Mobile App for LoRaWAN signal detect and GPS tracking.

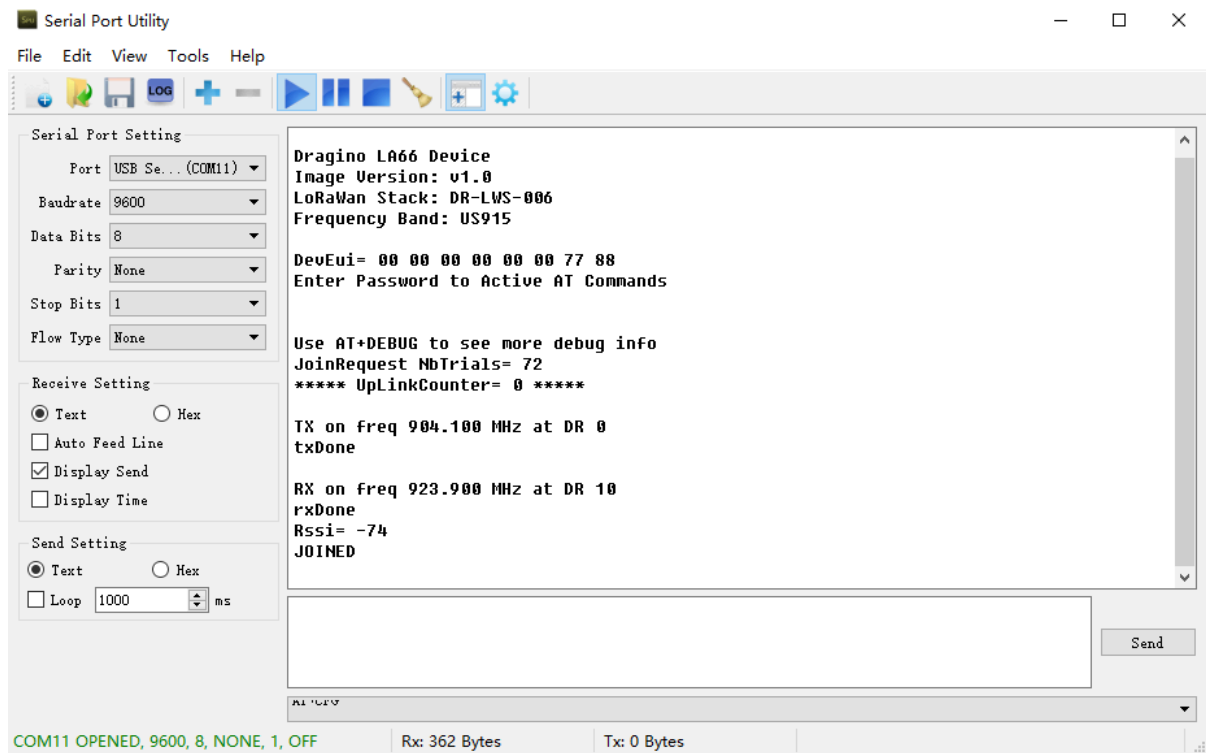
Specification

- CPU: 32-bit 48 MHz
- Flash: 256KB
- RAM: 64KB
- Input Power Range: 5v
- Frequency Range:
 - LORA: 904.6-923.3MHz
- Hybrid System: 902.5-914.7MHz
- Maximum Power constant RF output
 - Lora: 8.26dBm, Hybrid System: 8.18dBm
- High sensitivity: -148 dBm
- Temperature:
 - Storage: -55 ~ +125°C
 - Operating: -40 ~ +85°C
- Humidity:
 - Storage: 5 ~ 95% (Non-Condensing)
 - Operating: 10 ~ 95% (Non-Condensing)
- LoRa Tx Current: <90 mA at +17 dBm, 108 mA at +22 dBm
- LoRa Rx current: <9 mA



2. Press the reset switch RST on the LA66 USB Adapter V2 to reset it.

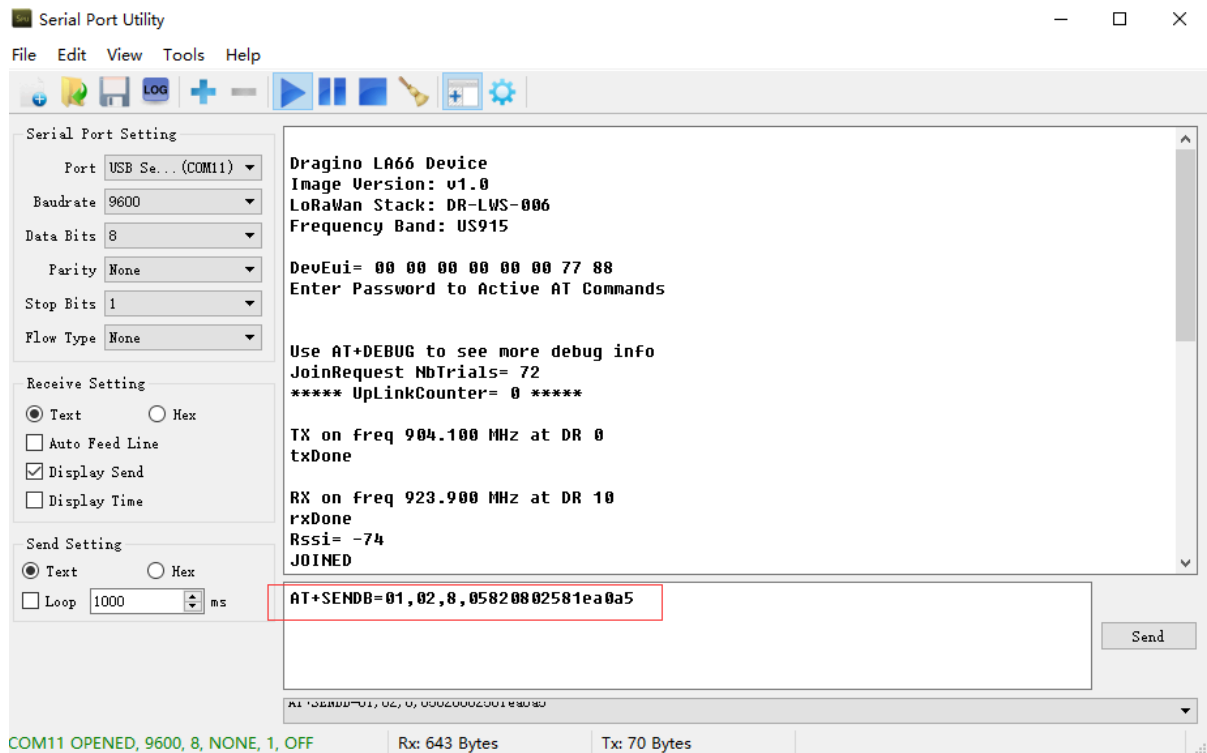
The following picture appears to prove that the LA66 USB Adapter V2 successfully Join the LoRaWAN network



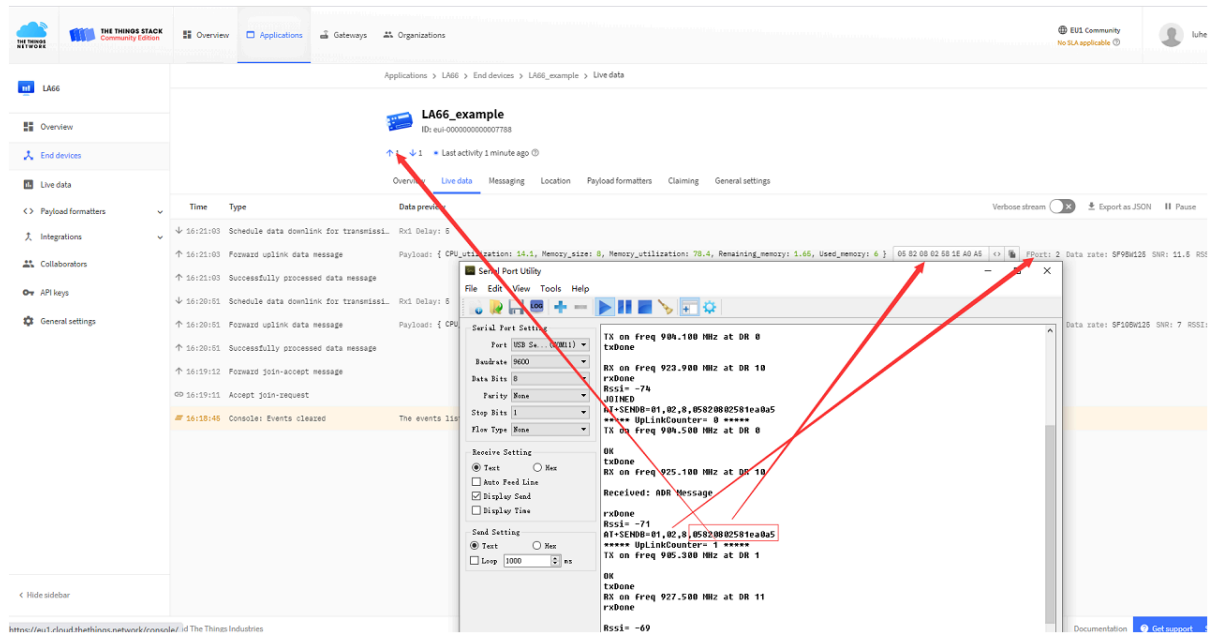
3. See Uplink Command

Command format: **AT+SENDB=<confirm_status>,<Fport>,<data_len>,<data>**

example: AT+SENDB=01,02,8,05820802581ea0a5

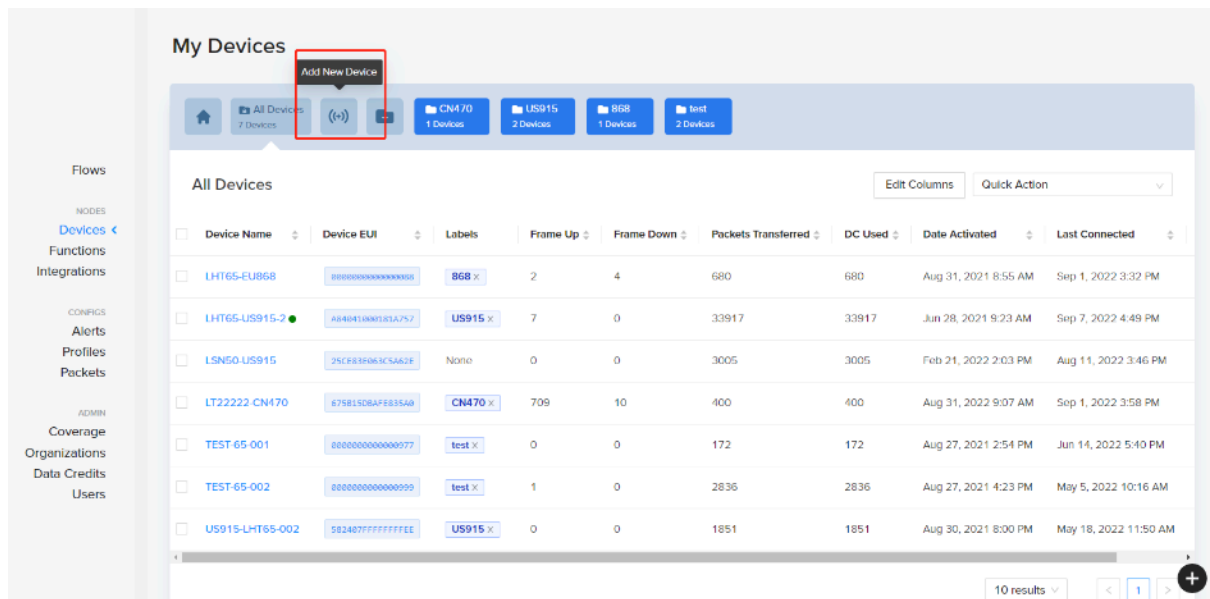


4. Check to see if TTN received the message



Example: How to join helium

1. Create a new device.



2. Save the device after filling in the necessary information.

Add New Device

Important: The first time a device joins the Network could take up to 20 mins. [Learn more about adding devices](#)

ENTER DEVICE DETAILS

Name

Device Name

0/50

Dev EUI

E2DF989D1E6039AB

8 / 8 Bytes

App EUI

9974737EC661D549

8 / 8 Bytes

App Key

F2FEDDFB6D812145D519A48DD88A654

16 / 16 Bytes

Profile (Optional)

Select a profile ▾

Attach a Label (Optional)

Search or Add Label...

Save Device

Import Devices

You can import your devices directly from the Things Network, or in bulk via .csv upload.

[How do I format my .csv?](#)

Things Network

Drag .csv file here or click to choose file

optional

search of Command AT+CFG

search of command AT+CFG

search of command AT+CFG

Page 9/ 26 - last modified by Mengting Qiu on 2024/04/01 17:22

```
[16:34:48.480] RX on freq 923.300 MHz at DR 8
[16:34:48.517] rxTimeout
[17:02:39.776] AT+CFG

[17:02:39.819] Stop Tx events, Please wait for the erase to complete
AT+DEUI=A8 40 41 00 01 81 A7 57
[17:02:39.888] AT+APPEUI=25 B9 75 24 5F 87 1C 56
[17:02:39.927] AT+APPKEY=15 E8 77 3C 5C 46 28 A9 A3 F1 23 57 9A 11 61 48
[17:02:39.987] AT+DAUDUR=0184E9B1
[17:02:40.027] AT+APPSKEY=82 54 64 A4 6D 5E 99 FA 3D 6C 8B E8 42 67 87 C4
[17:02:40.087] AT+NWKSKEY=F6 B7 38 CD 6C A8 EE BE 55 9F D6 8A 6E EA B4 15
[17:02:40.128] AT+ADR=1
[17:02:40.158] AT+TXP=0
[17:02:40.158] AT+DR=0
[17:02:40.158] AT+DCS=0
[17:02:40.187] AT+PNM=1
[17:02:40.187] AT+RX2FQ=923300000
[17:02:40.227] AT+RX2DR=8
[17:02:40.227] AT+RX1DL=1000
[17:02:40.227] AT+RX2DL=2000

AT+CFG

Send

AT+CFG

9,592 Bytes Tx: 1,264 Bytes Alithon
```

3. Network successfully.

```
[16:28:22.114]
[16:28:22.121] Dragino LA66 Device
[16:28:22.121] Image Version: v1.0
[16:28:22.151] LoRaWan Stack: DR-LWS-007
[16:28:22.181] Frequency Band: US915
[16:28:22.181] DevEui= A8 40 41 00 01 81 A7 57
[16:28:22.293] JoinRequest NbTrials= 72
[16:28:22.301]
[16:28:22.301] ***** UpLinkCounter= 0 *****
[16:28:22.332] TX on freq 904.300 MHz at DR 0
[16:28:22.656] txDone
[16:28:27.670] RX on freq 924.500 MHz at DR 10
[16:28:27.758] rxDone
[16:28:27.761] Rssi= -77
JOINED
```

4. Send uplink using command

```

16:34:11.017] AT+SENDB=1,1,4,12345678

16:34:11.079] ***** UpLinkCounter= 0 *****
16:34:11.088] TX on freq 904.500 MHz at DR 0
16:34:11.117]
16:34:11.118] OK
16:34:11.395] txDone
16:34:12.407] RX on freq 925.100 MHz at DR 10
16:34:12.410]
16:34:12.422] rxTimeout
16:34:13.418] RX on freq 923.300 MHz at DR 8
16:34:13.454] rxTimeout
16:34:17.085] ***** UpLinkCounter= 0 *****
16:34:17.088] TX on freq 904.900 MHz at DR 0
16:34:17.400] txDone
16:34:18.415] RX on freq 926.300 MHz at DR 10
16:34:18.428] rxTimeout
16:34:19.423] RX on freq 923.300 MHz at DR 8
16:34:19.459] rxTimeout
16:34:21.093] ***** UpLinkCounter= 0 *****

```

Event Log ☐ Expand All ☐ Filter Events w/ Commands ☐ Show Dropped Uplinks: ☐ Late ☐ Inactive Device Exp			
Event	Type	No. of Hotspots	Time
+ 	Uplink ✓	1	Sep 7, 2022 4:49:51.361 PM
+ 	Uplink ✓	1	Sep 7, 2022 4:29:52.778 PM
+ 	Downlink	1	Sep 7, 2022 4:29:51.758 PM
+ 	Uplink ✓	1	Sep 7, 2022 4:29:51.358 PM
+ 	Join Accept	1	Sep 7, 2022 4:28:24.445 PM
+ 	Join Request	1	Sep 7, 2022 4:28:22.444 PM

Example: Send PC's CPU/RAM usage to TTN via python

Use python as an example: https://github.com/dragino/LA66/blob/main/Send_information_to_TTN_WindosPC.py

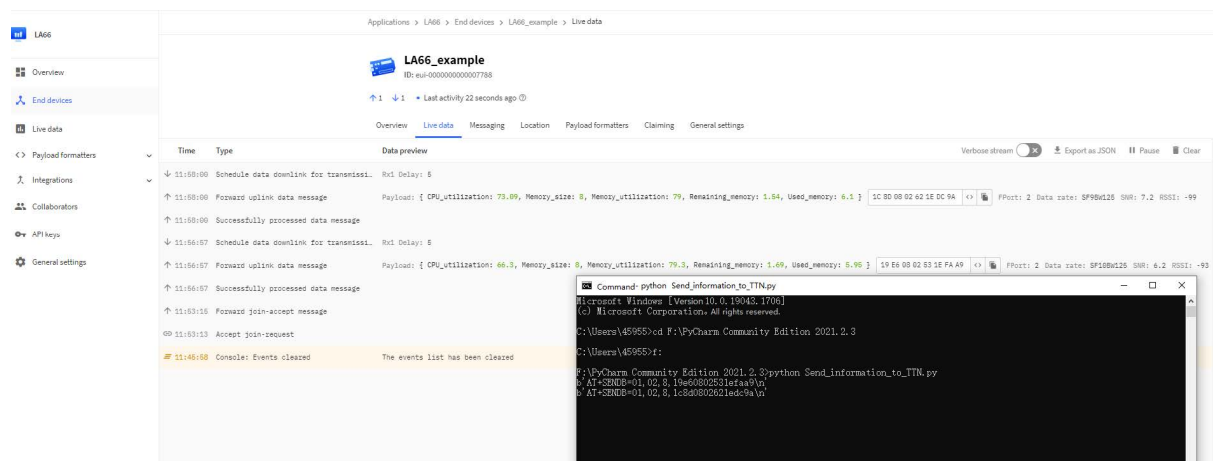
(Raspberry Pi example: https://github.com/dragino/LA66/blob/main/Send_information_to_TTN_Raspberry%20Pi.py)

Preconditions:

1. LA66 USB Adapter V2 works fine
2. LA66 USB Adapter V2 is registered with TTN

Steps for usage:

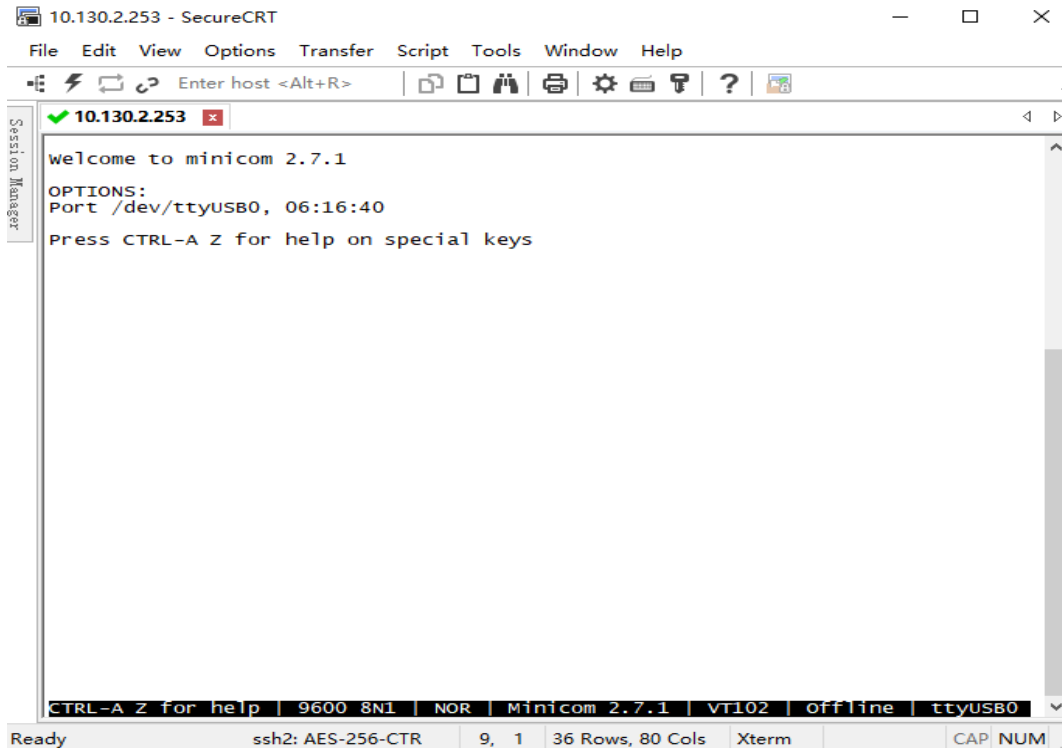
1. Press the reset switch RESET on the LA66 USB Adapter V2
2. Add [decoder](#) on TTN
3. Run the python script in PC and see the TTN



Example: Send & Get Messages via LoRaWAN in RPi

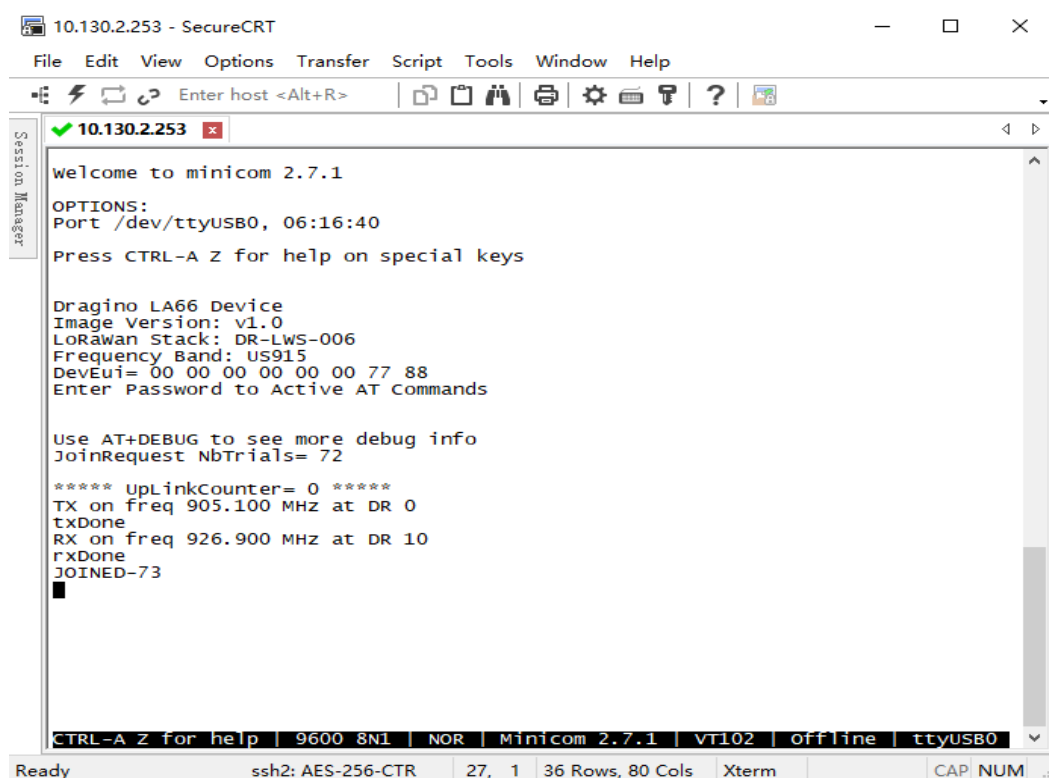
Assume user already input the LA66 USB Adapter V2 OTAA Keys in TTN and there is already TTN network coverage.

1. **Connect the LA66 USB Adapter V2 to the Raspberry Pi**



2. Press the reset switch RST on the LA66 USB Adapter V2.

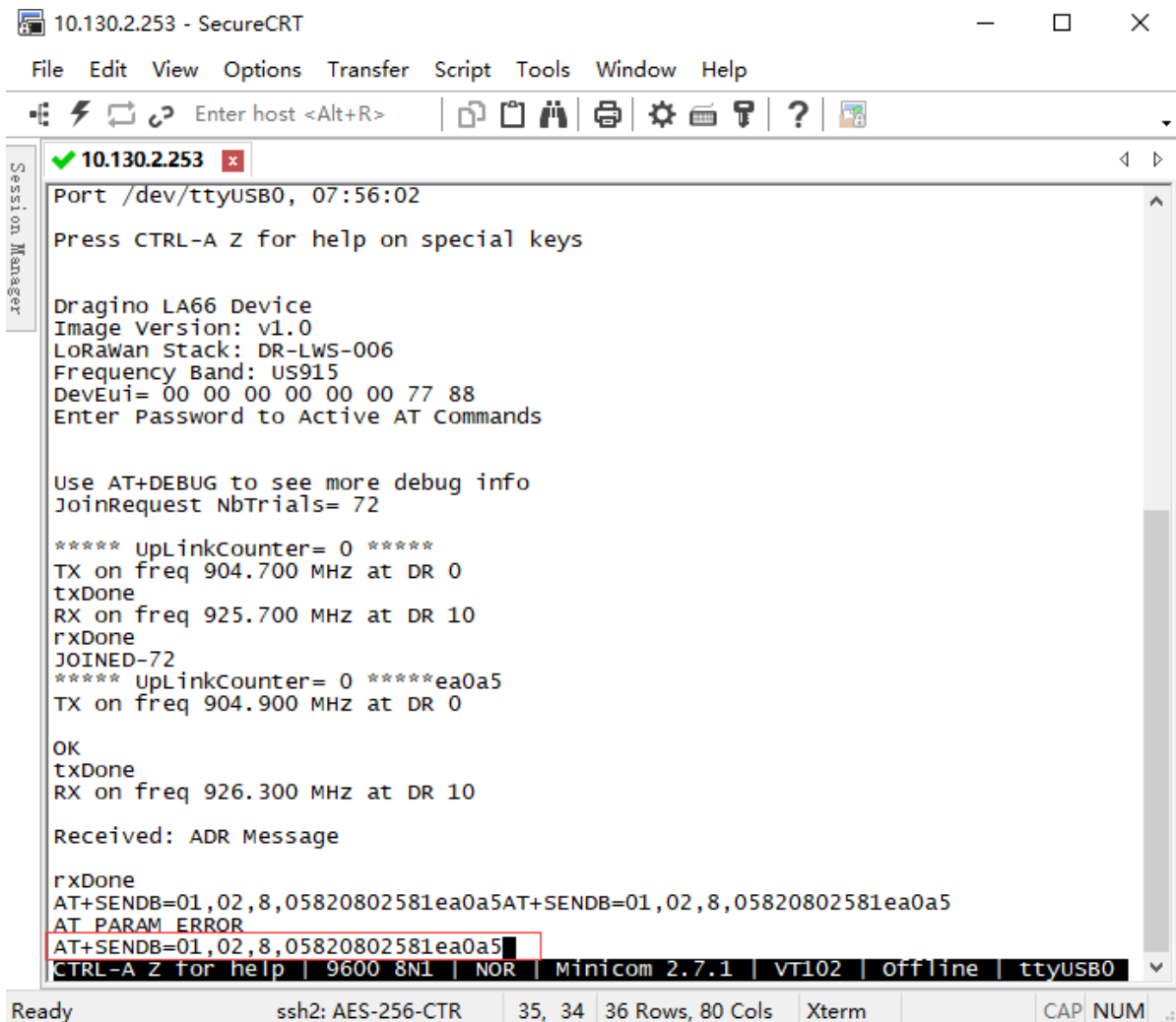
The following picture appears to prove that the LA66 USB Adapter V2 successfully entered the network.



3. Send Uplink message

Format: **AT+SENDB=<confirm_status>,<Fport>,<data_len>,<data>**

example: AT+SENDB=01,02,8,05820802581ea0a5



```
10.130.2.253 - SecureCRT
File Edit View Options Transfer Script Tools Window Help
Enter host <Alt+R>
10.130.2.253 x
Port /dev/ttyUSB0, 07:56:02
Press CTRL-A Z for help on special keys

Dragino LA66 Device
Image Version: v1.0
LoRaWAN Stack: DR-LWS-006
Frequency Band: US915
DevEui= 00 00 00 00 00 00 77 88
Enter Password to Active AT Commands

Use AT+DEBUG to see more debug info
JoinRequest NbTrials= 72

***** UpLinkCounter= 0 *****
TX on freq 904.700 MHz at DR 0
txDone
RX on freq 925.700 MHz at DR 10
rxDone
JOINED-72
***** UpLinkCounter= 0 *****ea0a5
TX on freq 904.900 MHz at DR 0

OK
txDone
RX on freq 926.300 MHz at DR 10

Received: ADR Message

rxDone
AT+SENDB=01,02,8,05820802581ea0a5AT+SENDB=01,02,8,05820802581ea0a5
AT PARAM ERROR
AT+SENDB=01,02,8,05820802581ea0a5
CTRL-A Z for help | 9600 8N1 | NOR | Minicom 2.7.1 | VT102 | offline | ttyUSB0
Ready ssh2: AES-256-CTR 35, 34 36 Rows, 80 Cols Xterm CAP NUM
```

Check to see if TTN received the message

The screenshot displays the TTN console interface for the device **LA66_example** (ID: eu1-000000000000007788). The **Live data** tab is selected, showing a list of events in the **Data review** table. A red arrow points from the **Live data** tab to the **Data review** table. Another red arrow points from the **Data review** table to the **Console** tab, which shows the AT+DEBUG output. A third red arrow points from the **Console** tab to the **Live data** tab.

LA66_example
ID: eu1-000000000000007788

Overview | Live data | Messaging | Location | Payload formatters | Claiming | General settings

Data review

Time	Type	Details
16:04:44	Schedule data downlink for transmissi...	Rx1 Delay: 5
16:04:43	Forward uplink data message	Payload: { CPU_utilization: 44.1, Memory_size: 8, Memory_utilization: 78.4, Remaining_memory: 1.46, Used_memory: 6 } 05 02 08 02 88 1E 40 A5
16:04:43	Successfully processed data message	
16:04:46	Schedule data downlink for transmissi...	Rx1 Delay: 5
16:04:46	Forward uplink data message	Payload: { CPU_utilization: 44.1, Memory_size: 8, Memory_utilization: 78.4, Remaining_memory: 1.46, Used_memory: 6 } 05 02 08 02 88 1E 40 A5
16:04:46	Successfully processed data message	
16:08:25	Forward join-accept message	
16:08:23	Accept join-request	
16:08:25	Console: Events cleared	The events list has been cleared

Console

```
AT+DEBUG to see more debug info
***** uplinkcounter= 0 *****
TX on Freq 904.700 MHz at DR 0
TXDone
RX on Freq 925.700 MHz at DR 10
rxDone
***** uplinkcounter= 0 *****ea0a5
TX on Freq 904.900 MHz at DR 0
OK
ExDone
RX on Freq 926.300 MHz at DR 10
received: ADR Message
rxDone
AT+SEND=01,02,8,05820802581ea0a5AT+SEND=01,02,8,05820802581ea0a5
AT+PANAW_ERROR
***** uplinkcounter= 1 *****ea0a5
TX on Freq 904.100 MHz at DR 3
OK
ExDone
RX on Freq 923.900 MHz at DR 13
rxDone
RSSI=-68
```

Example: Use of LA66 USB Adapter V2 and mobile APP 1.9.

Hardware and Software Connection

Overview:

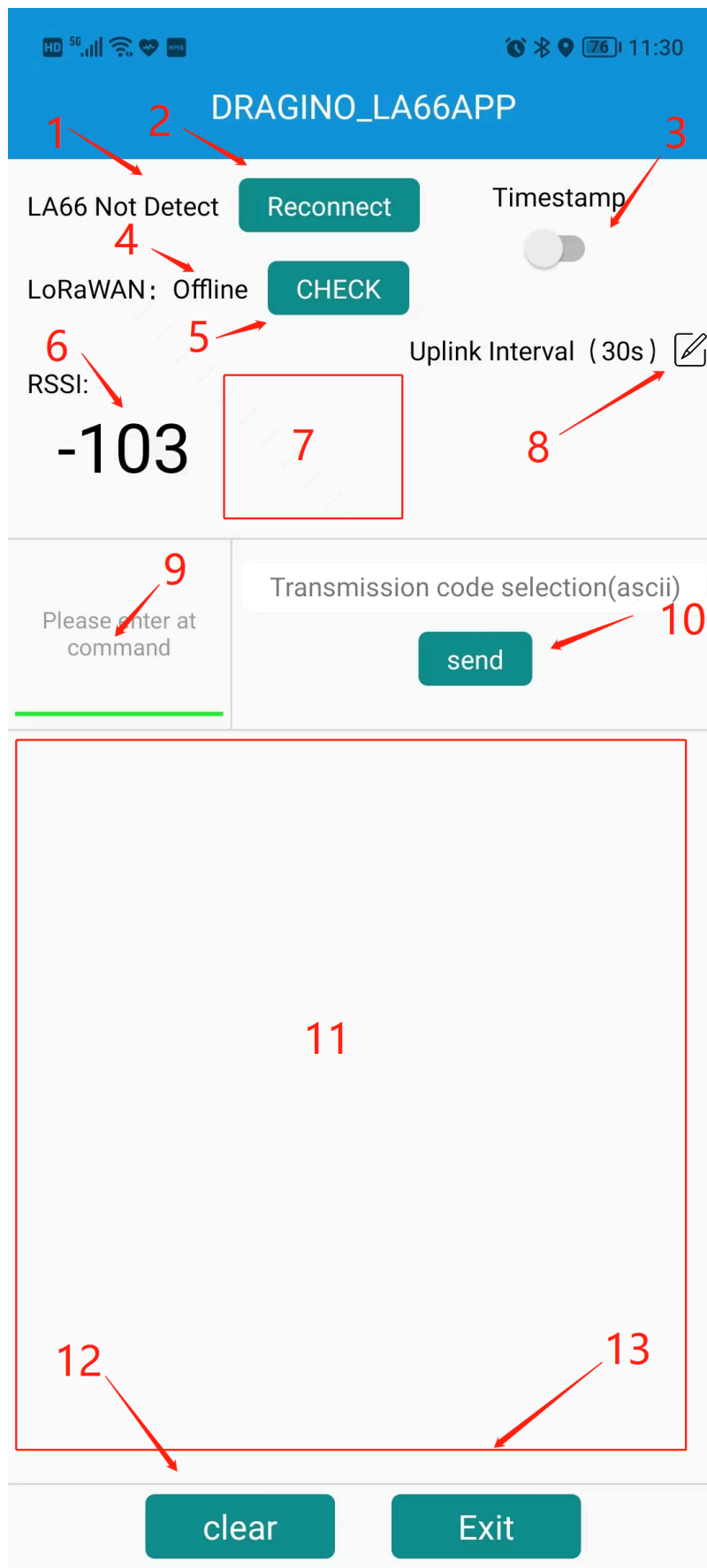
DRAGINO-LA66-APP is an Open Source mobile APP for LA66 USB Adapter V2. DRAGINO-LA66-APP has below features:

- Send real-time location information of mobile phone to LoRaWAN network.
- Check LoRaWAN network signal strength.
- Manually send messages to LoRaWAN network.

Hardware Connection:

A USB to Type-C adapter is needed to connect to a Mobile phone.

Note: The package of LA66 USB adapter already includes this USB Type-C adapter.



1.Block Explain:

1. Display LA66 USB LoRaWAN Module connection status
2. Check and reconnect
3. Turn send timestamps on or off
4. Display LoRaWan connection status
5. Check LoRaWan connection status
6. The RSSI value of the node when the ACK is received
7. Node's Signal Strength Icon
8. Configure Location Uplink Interval
9. AT command input box
10. Send Button: Send input box info to LA66 USB Adapter
11. Output Log from LA66 USB adapter
12. clear log button
13. exit button

LA66 USB LoRaWAN Module not connected:

Applications > LA66 > End devices > eui-a840415e7184e9c0

**eui-a840415e7184e9c0**
ID: eui-a840415e7184e9c0

↑ 3 ↓ 3 • Last activity 2 hours ago ⓘ

[Overview](#) [Live data](#) [Messaging](#) [Location](#) [Payload formatters](#) [Claiming](#) [General settings](#)

General information

End device ID

eui-a840415e7184e9c0

Frequency plan

United States 902-928 MHz, FSB 2 (used by ...)

LoRaWAN version

LoRaWAN Specification 1.0.3

Regional Parameters version

RP001 Regional Parameters 1.0.3 revision A

Created at

Jul 15, 2022 09:40:08

Activation information

AppEUI

A8 40 41 C0 00 00 01 01

<>

DevEUI

A8 40 41 E5 71 84 E9 C0

<>

AppKey

.....

Session information

Session start

Jul 23, 2022 11:23:13

Device address

26 0B A6 4F

<>

NwkSKey

.....

SNwkSIntKey

.....

NwkSEncKey

.....

AppSKey

.....

Live data

See all activity →

↑ 11:26:27

Forward join-accept message

↻ 11:26:26

Accept join-request

↓ 11:24:44

Schedule data downlink for transmission on Gateway Server

↑ 11:24:43

Forward location solved message

✎ 11:24:43

Update end device

↑ 11:24:43

Forward uplink data message

2. Open Node-RED,And import the JSON file to generate the flow

Sample JSON file please go to [this link](#) to download.

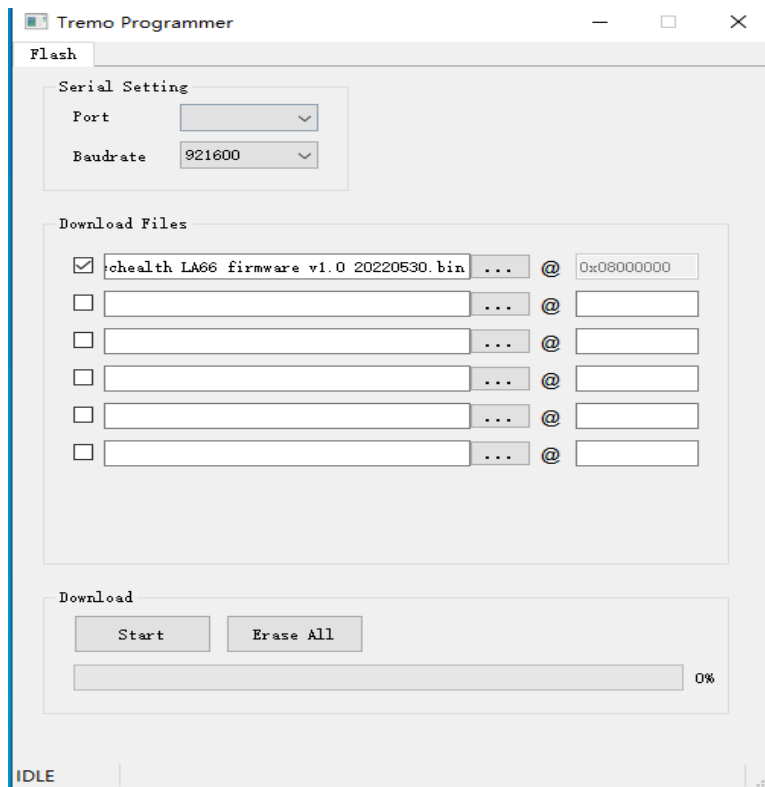
For the usage of Node-RED, please refer to: <http://wiki.dragino.com/xwiki/bin/view/Main/Node-RED/>

After see LoRaWAN Online, walk around and the APP will keep sending location info to LoRaWAN server and then to the Node Red.

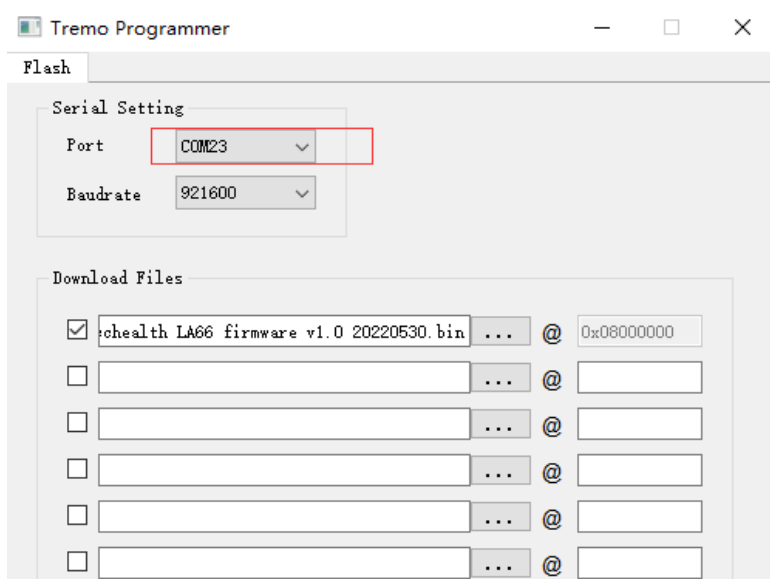
LA66--node-red--decoder:[dragino-end-node-decoder/Node-RED at main · dragino/dragino-end-node-decoder · GitHub](#)

Open the Upgrade tool (Tremo Programmer) in PC and Upgrade

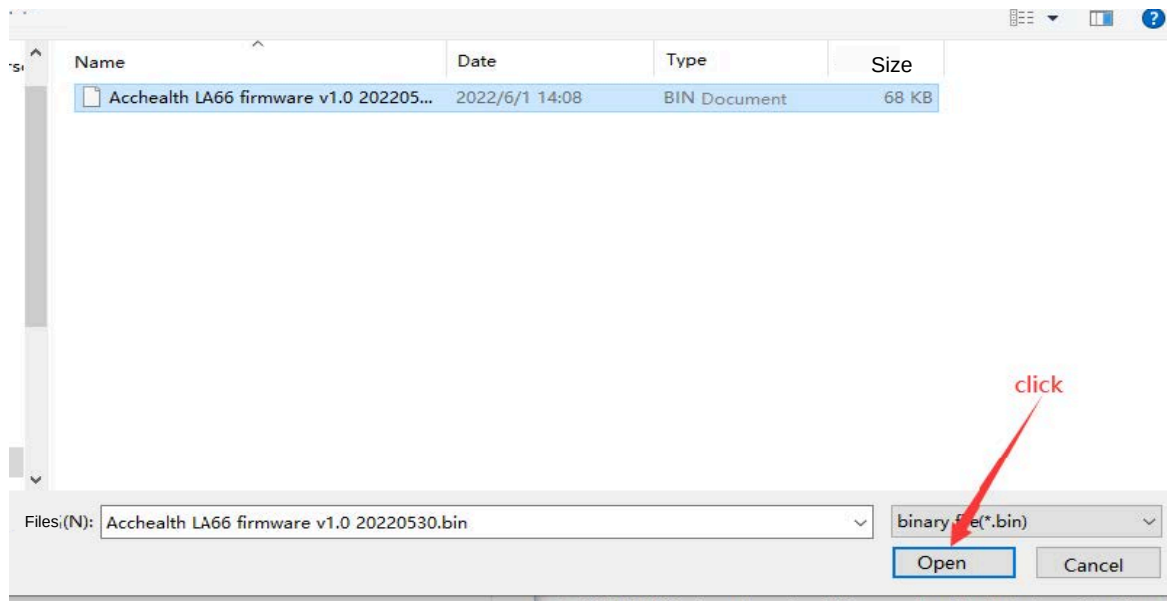
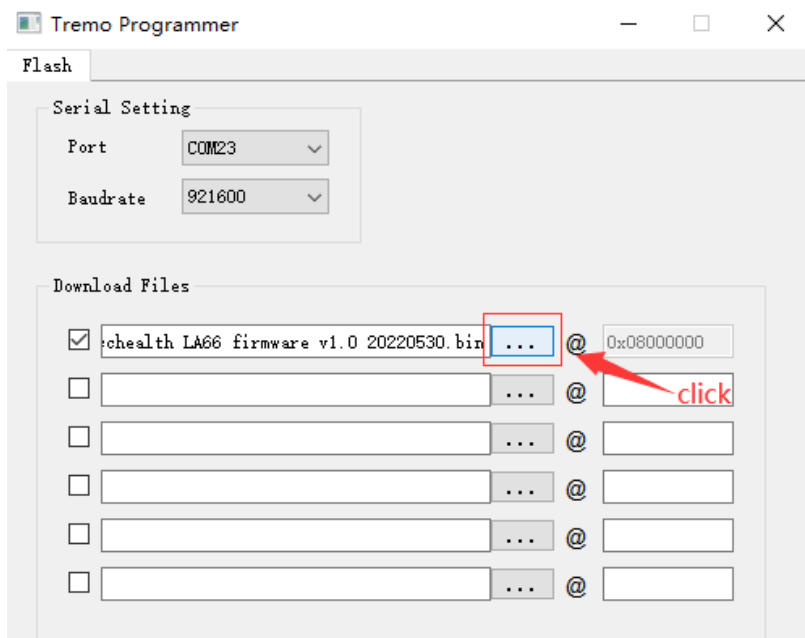
1. Software download link: <https://www.dropbox.com/sh/j0qyc7a9ejit7jk/AACtx2tK4gEv6YFXMIVUM4dLa?dl=0>

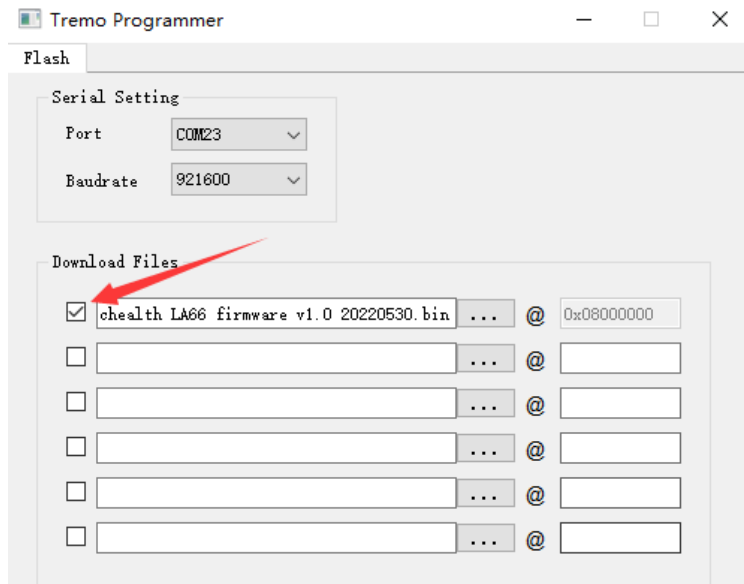


2. Select the COM port corresponding to USB TTL

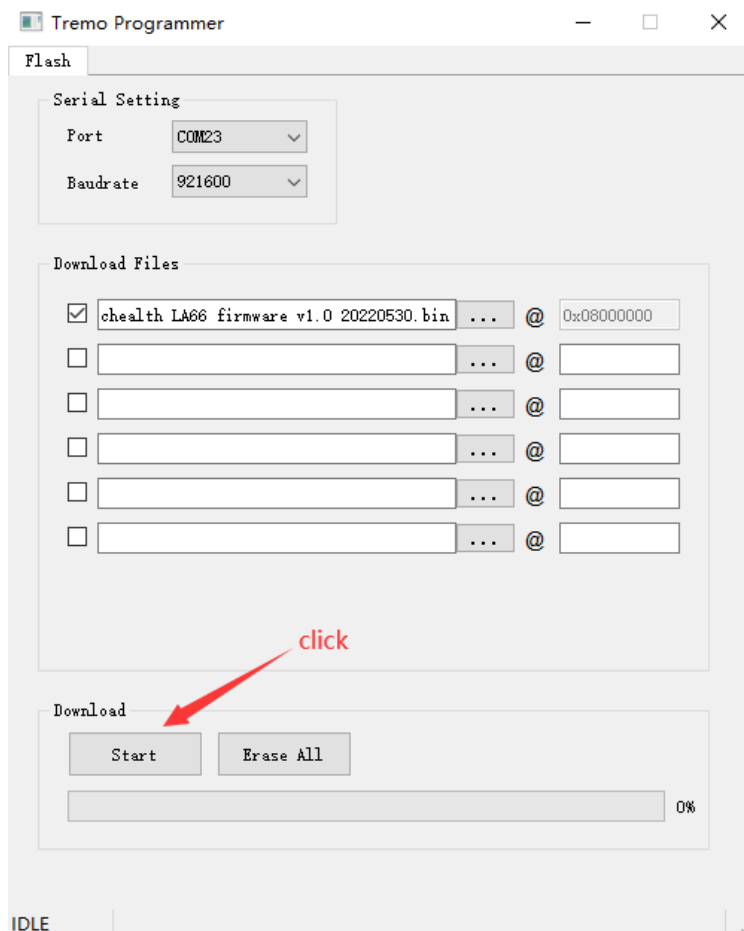


3. Select the bin file to burn





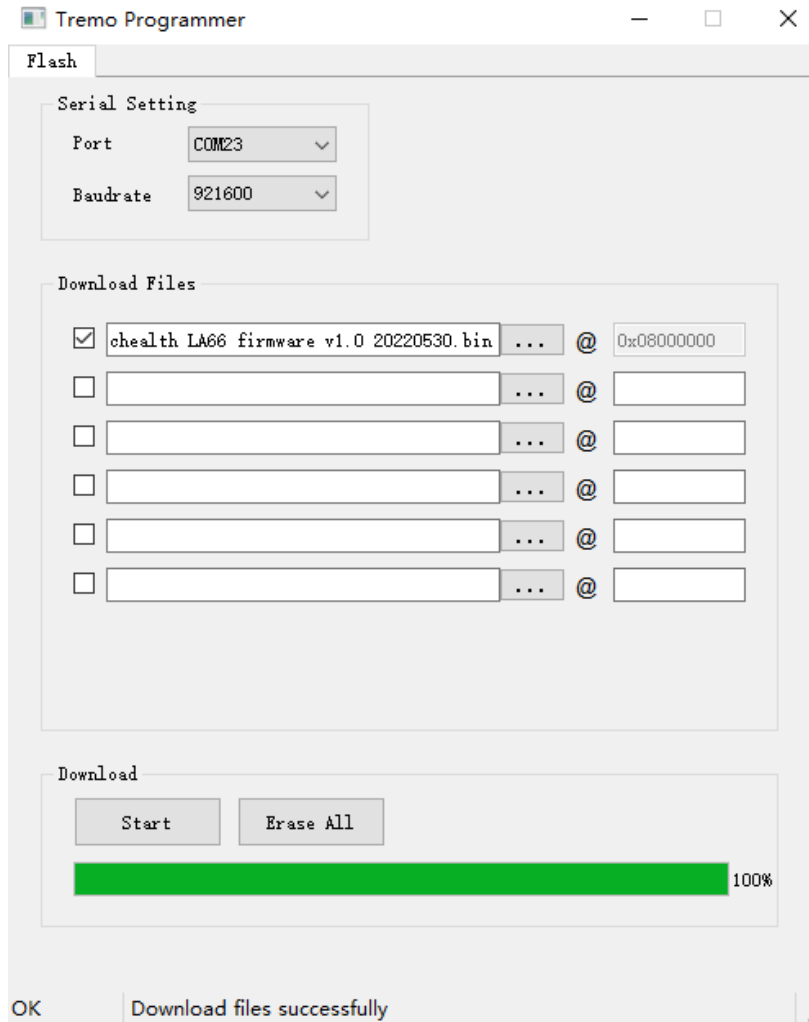
4. Click to start the download



5. Check update process



6.The following picture shows that the burning is successful



1.10.2 LA66V2 Update method

Firmware download (Please **select withbootloader** version) :

[Firmware - Dropbox](#)

Firmware update method:

Please refer to this link

<http://wiki.dragino.com/xwiki/bin/view/Main/UART%20Access%20for%20LoRa%20ST%20v4%20base%20model/#H3.2.1UpdateafirmwareviaDraginoSensorManagerUtility.exe>

FAQ

How to Compile Source Code for LA66?

Compile and Upload Code to ASR6601 Platform : [Instruction](#)

Where to find Peer-to-Peer firmware of LA66?

Instruction for LA66 Peer to Peer firmware : [Instruction](#)

My device keeps showing invalid credentials, the device goes into low power mode

Set the AT+COMMAND: **AT+UUID=666666666666**

How to use external antenna via ipex connector?

You need to remove the spring antenna first, and also remove the resistor and capacitor.
Connect external antenna.

Order Info

Part Number: **LA66 USB Adapter V2-XXX**

XXX: The default frequency band

- **AS923:** LoRaWAN AS923 band
- **AU915:** LoRaWAN AU915 band
- **EU433:** LoRaWAN EU433 band
- **EU868:** LoRaWAN EU868 band
- **KR920:** LoRaWAN KR920 band
- **US915:** LoRaWAN US915 band
- **IN865:** LoRaWAN IN865 band
- **CN470:** LoRaWAN CN470 band
- **PP:** Peer to Peer LoRa Protocol

Reference

- Hardware Design File for LA66 USB Adapter V2 : [Download](#)
- Mobile Phone App Source Code: [Download](#).

FCC Statement

FCC Caution:

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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.

IMPORTANT NOTE:

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.

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.