DRAGINO NSE01 NB-IoT Soil Moisture and EC Sensor User Manual

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NSE01 NB-IoT Soil Moisture and EC Sensor

NSE01 NB-IoT Soil Moisture & EC Sensor

Introduction

The NSE01 Soil Moisture & EC Sensor is equipped with a NB-IoT module that sends environment data from sensors to a local NB-IoT network, which forwards the data to an IoT server via a protocol defined by the NSE01.

Features

- Equipped with a NB-IoT module
- Measures soil moisture and EC levels
- Sends data to local NB-IoT network
- Supports CoAP, raw UDP, MQTT, and TCP protocols for data transmission

Specification

Probe Specification: Measures volume based on the central pin of the probe, which is a cylinder with a 7cm diameter and 10cm height.

Dimension

Main Device Dimension: Refer to LSN50v2 from: https://www.dragino.com/downloads/index.php?dir=LSN50-LoRaST/Mechanical_Drawing/

Probe Dimension: Not specified in the manual.

Applications

The NSE01 Soil Moisture & EC Sensor can be used for monitoring soil moisture and EC levels in agriculture, horticulture, and landscaping applications.

Pin Definitions

Not specified in the manual.

Using the NSE01 to Communicate with IoT Server

How it Works

The pre-loaded firmware in the NSE01 gets environment data from the sensors and sends the value to a local NB-IoT network via the NB-IoT module. The network then forwards this value to an IoT server using a protocol defined by the NSE01.

Configure the NSE01

Test Requirement

To use the NSE01 in your city, you must meet the following requirements:

- Have NB-IoT network coverage
- Use a SIM card from your provider

Insert SIM Card

Insert the NB-IoT card from your provider by removing the NB-IoT module and inserting the SIM card. Then, configure the NSE01 via serial port to set the server address and uplink topic to define where and how to uplink packets. Use the provided AT commands and a USB to TTL adapter to connect to the NSE01.

Use CoAP Protocol to Uplink Data

If you do not have a CoAP server, refer to this link to set one up:
http://wiki.dragino.com/xwiki/bin/view/Main/Set%20up%20CoAP%20Server/

Access NB-IoT Module

Not specified in the manual.

Using the AT Commands

To access the AT commands, connect a USB to TTL adapter to the NSE01 and use the valid AT commands found at: https://www.dropbox.com/sh/351dwor6joz8nwh/AADn1BQaAAxLF_QMyU8NkW47a?dl=0

FAQ

Not specified in the manual.

Packing Info

Not specified in the manual.

Support

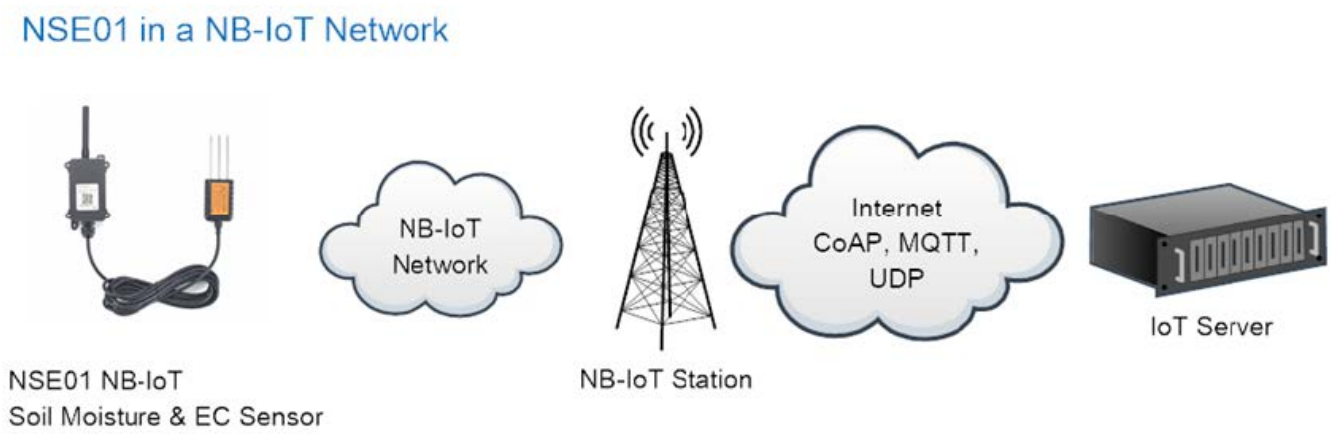
For support, refer to the manufacturer's website at: https://www.dragino.com/.

Product Introduction

What is NSE01 Soil Moisture & EC Sensor

The Dragino NSE01 is a NB-IOT soil moisture & EC sensor designed for IoT of Agriculture. It detects Soil Moisture, Soil Temperature and Soil Conductivity, and upload the value via wireless to IoT Server via NB-IoT Network.
NarrowBand-Internet of Things (NB-IoT) is a standards-based low power wide area (LPWA) technology developed to enable a wide range of new IoT devices and services. NB-IoT significantly improves the power consumption of user devices, system capacity and spectrum efficiency, especially in deep coverage.
NSE01 supports different uplink methods include TCP,MQTT,UDP and CoAP for different application requirement.
NES01 is powered by 8500mAh Li-SOCI2 battery, It is designed for long term use up to 5 years. (Actually Battery life depends on the use environment, update period & uplink method)
To use NSE01, user needs to check if there is NB-IoT coverage in local area and with the bands NSE01 supports. If the local operate support it, user needs to get a NB-IoT SIM card from local operator and install NSE01 to get NB-IoT network connection.



Product Features

- NB-IoT Bands: B1/B3/B8/B5/B20/B28 @H-FDD
- Monitor Soil Moisture
- Monitor Soil Temperature
- Monitor Soil Conductivity
- AT Commands to change parameters
- Uplink on periodically
- Downlink to change configure
- IP66 Waterproof Enclosure
- Ultra-Low Power consumption
- Micro SIM card slot for NB-IoT SIM
- 8500mAh Battery for long term use

Specification

Common DC Characteristics:

- Supply Voltage: 2.1v ~ 3.6v
- Operating Temperature: -40 ~ 85°C

NB-IoT Spec:

- B1 @H-FDD: 2100MHz
- B3 @H-FDD: 1800MHz
- B8 @H-FDD: 900MHz
- B5 @H-FDD: 850MHz
- B20 @H-FDD: 800MHz
- B28 @H-FDD: 700MHz

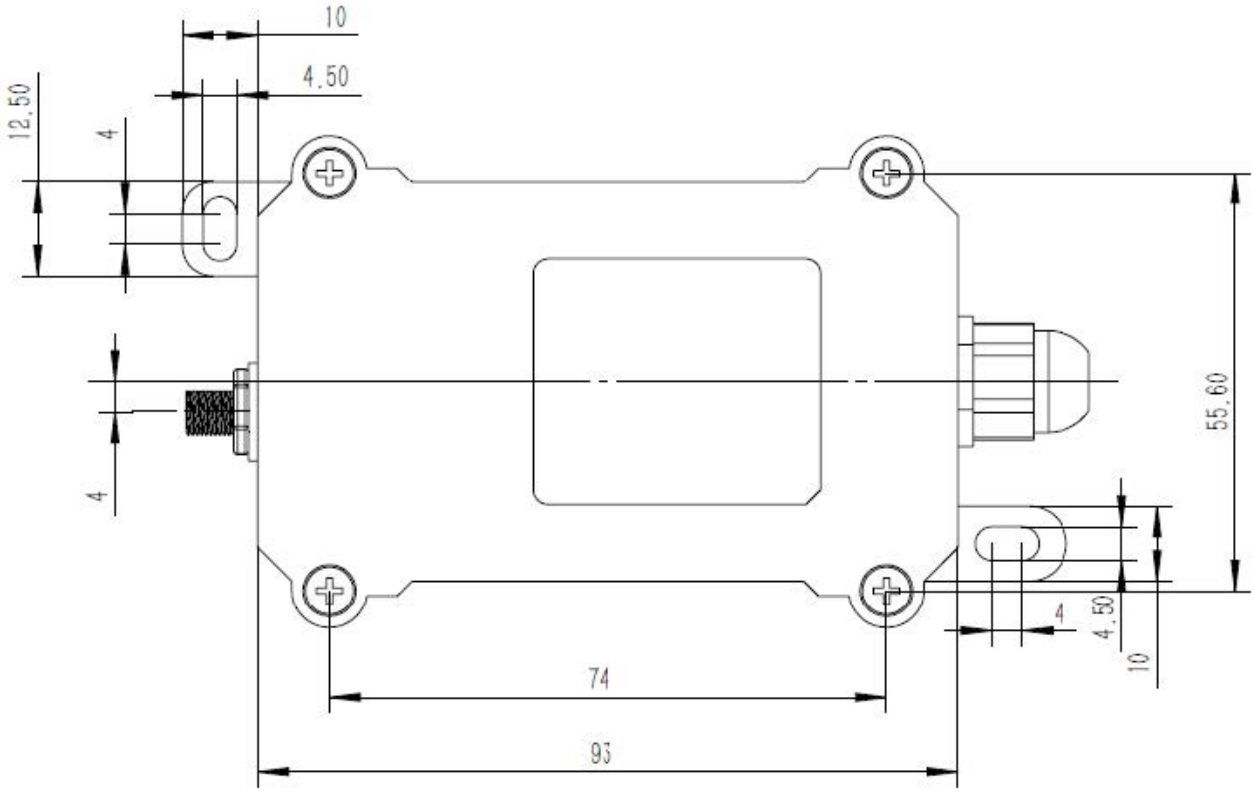
Probe Specification:
Measure Volume: Base on the centra pin of the probe, a cylinder with 7cm diameter and 10cm height.

Parameter	Soil Moisture	Soil Conductivity	Soil Temperature
Range	0-100.00%	0-20000uS/cm (25℃)(0-20.0EC)	-40.00℃~85.00℃
Unit	V/V %,	uS/cm,	℃
Resolution	0.01%	1 uS/cm	0.01℃
Accuracy	±3% (0-53%) ±5% (>53%)	2%FS,	-10℃~50℃:<0.3℃ All other: <0.6℃
Measure Method	FDR , with temperature &EC compensate	Conductivity , with temperature compensate	RTD, and calibrate

Dimension

Main Device Dimension:

See LSN50v2 from: https://www.dragino.com/downloads/index.php?dir=LSN50-LoRaST/Mechanical_Drawing/

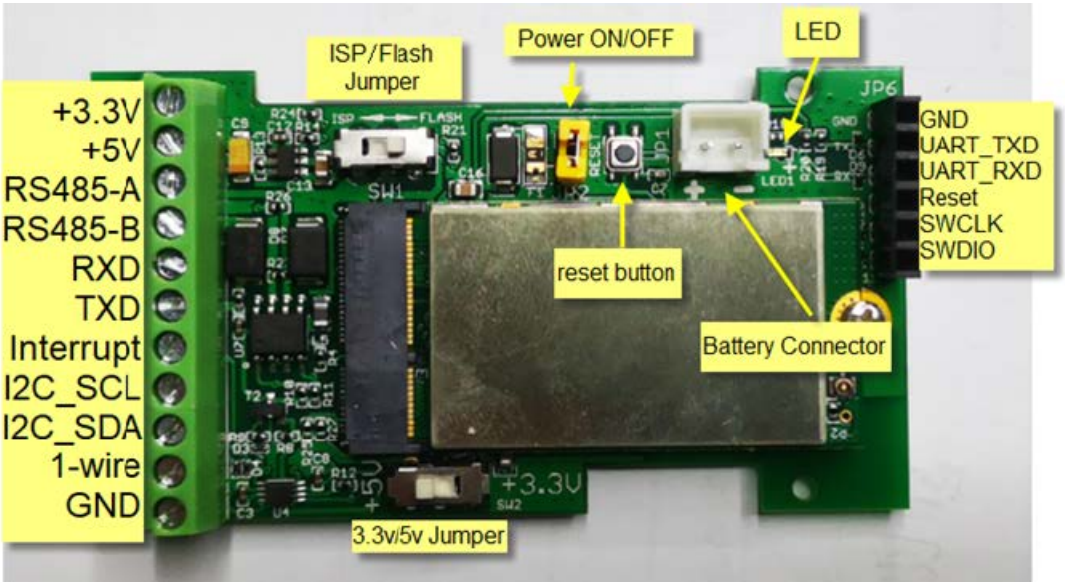


Probe Dimension

Applications

- Smart Agriculture

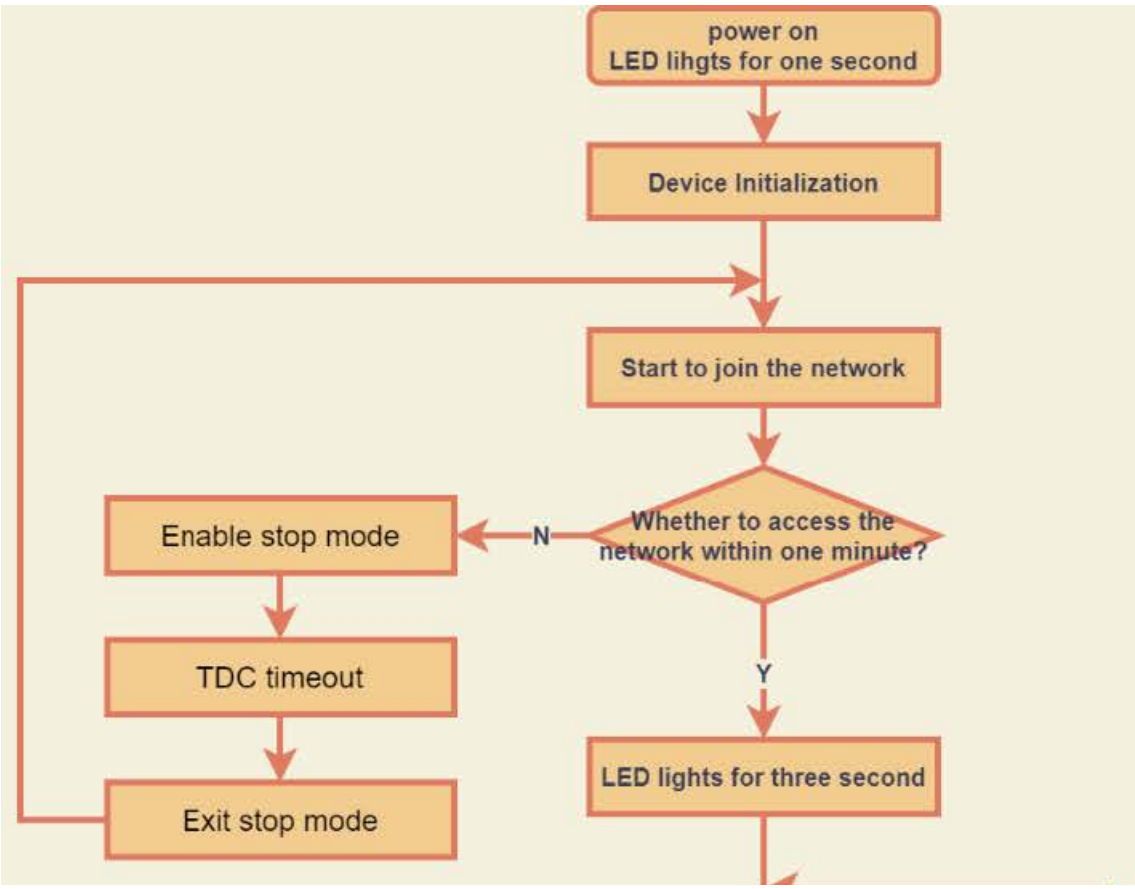
Pin Definitions

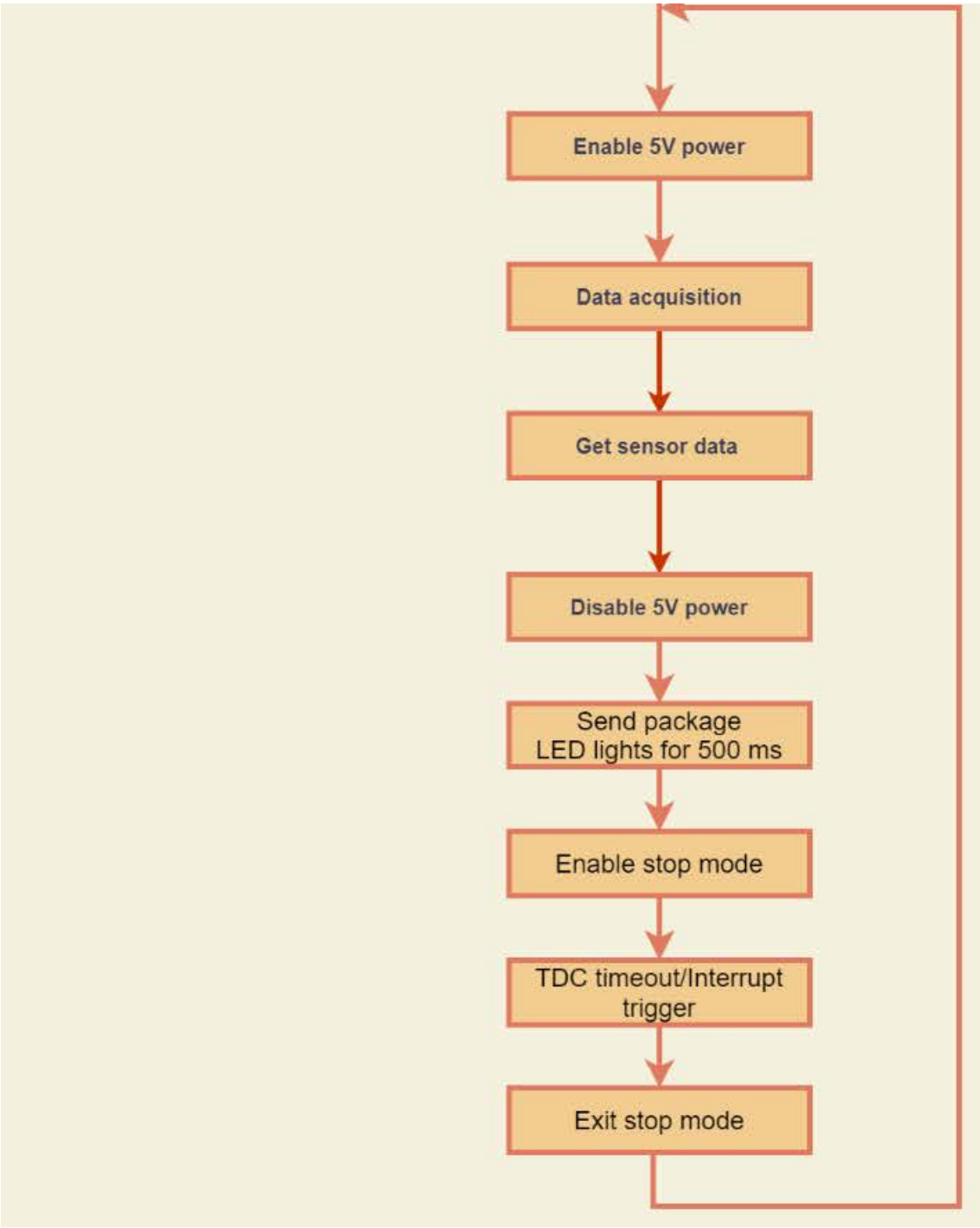


Use NSE01 to communicate with IoT Server

How it works

The NSE01 is equipped with a NB-IoT module, the pre-loaded firmware in NSE01 will get environment data from sensors and send the value to local NB-IoT network via the NB-IoT module. The NB-IoT network will forward this value to IoT server via the protocol defined by NSE01.
The diagram below shows the working flow in default firmware of NSE01:





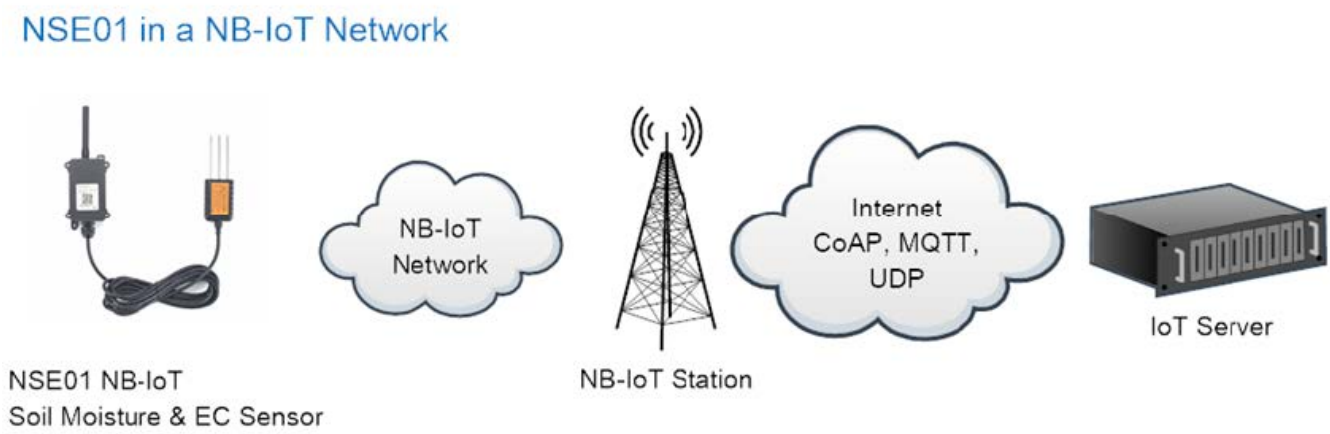
Configure the NSE01

Test Requirement

To use NSE01 in your city, make sure meet below requirements:

- Your local operator has already distributed a NB-IoT Network there.
- The local NB-IoT network used the band that NSE01 supports.
- Your operator is able to distribute the data received in their NB-IoT network to your IoT server.

Below figure shows our testing structure. Here we have NB-IoT network coverage by China Mobile, the band they use is B8. The NSE01 will use CoAP(120.24.4.116:5683) or raw UDP(120.24.4.116:5601) or MQTT(120.24.4.116:1883)or TCP(120.24.4.116:5600)protocol to send data to the test server



Insert SIM card
Insert the NB-IoT Card get from your provider.
User need to take out the NB-IoT module and insert the SIM card like below:

Connect USB – TTL to NSE01 to configure it
User need to configure NSE01 via serial port to set the Server Address / Uplink Topic to define where and how-to uplink packets. NSE01 support AT Commands, user can use a USB to TTL adapter to connect to NSE01 and use AT Commands to configure it, as below.

Connection:

- USB TTL GND <—-> GND
- USB TTL TXD <—-> UART_RXD
- USB TTL RXD <—-> UART_TXD

In the PC, use below serial tool settings:

- Baud: 9600
- Data bits: 8
- Stop bits: 1
- Parity: None

- Flow Control: None

Make sure the switch is in FLASH position, then power on device by connecting the jumper on NSE01. NSE01 will output system info once power on as below, we can enter the password: 12345678 to access AT Command input.

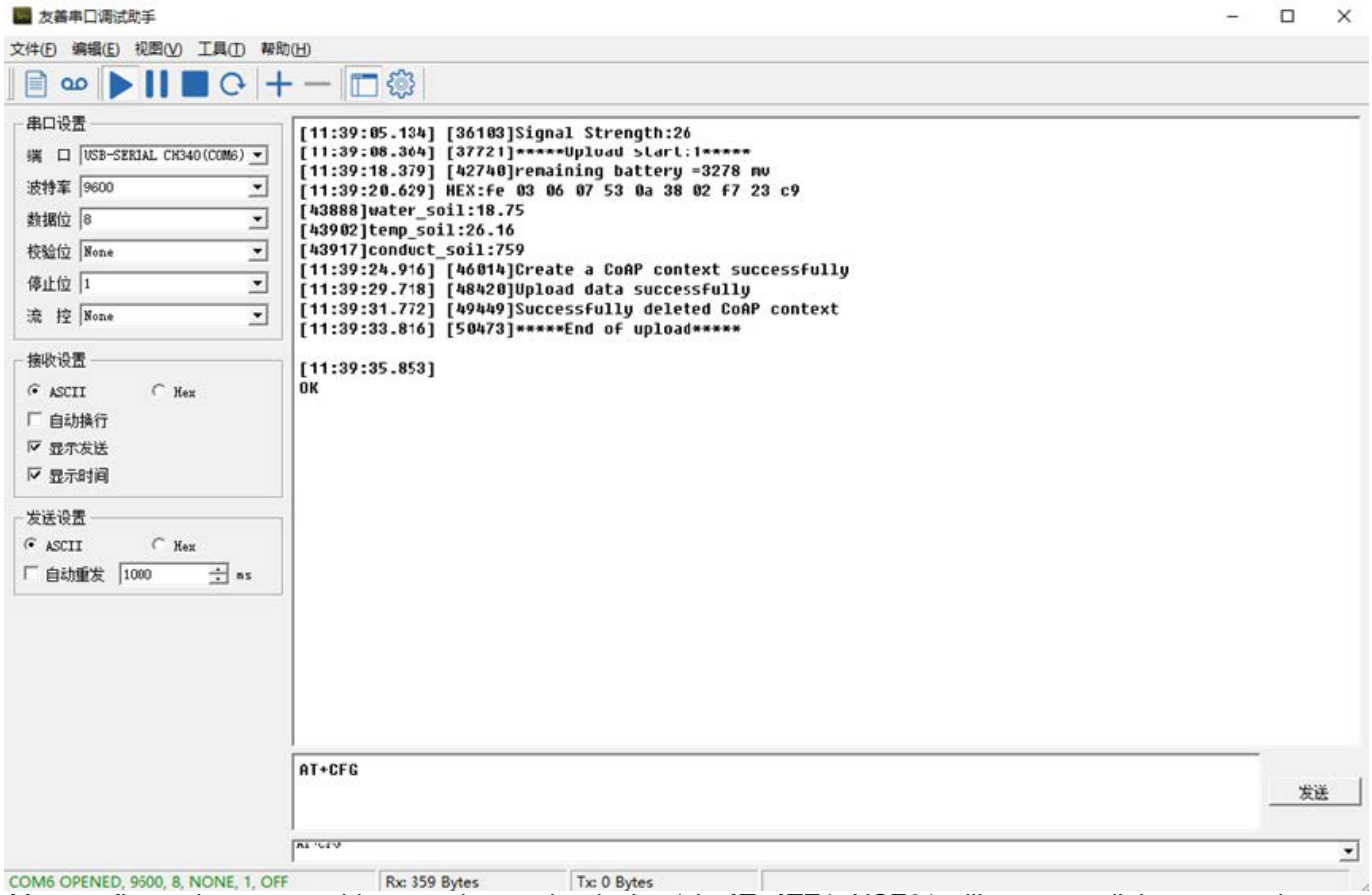
Note: the valid AT Commands can be found at: https://www.dropbox.com/sh/351dwor6joz8nwh/AADn1BQaAAxLF_QMyU8NkW47a?dl=0

Use CoAP protocol to uplink data
Note: if you don't have CoAP server, you can refer this link to set up one: http://wiki.dragino.com/xwiki/bin/view/Main/Set%20up%20CoAP%20Server/

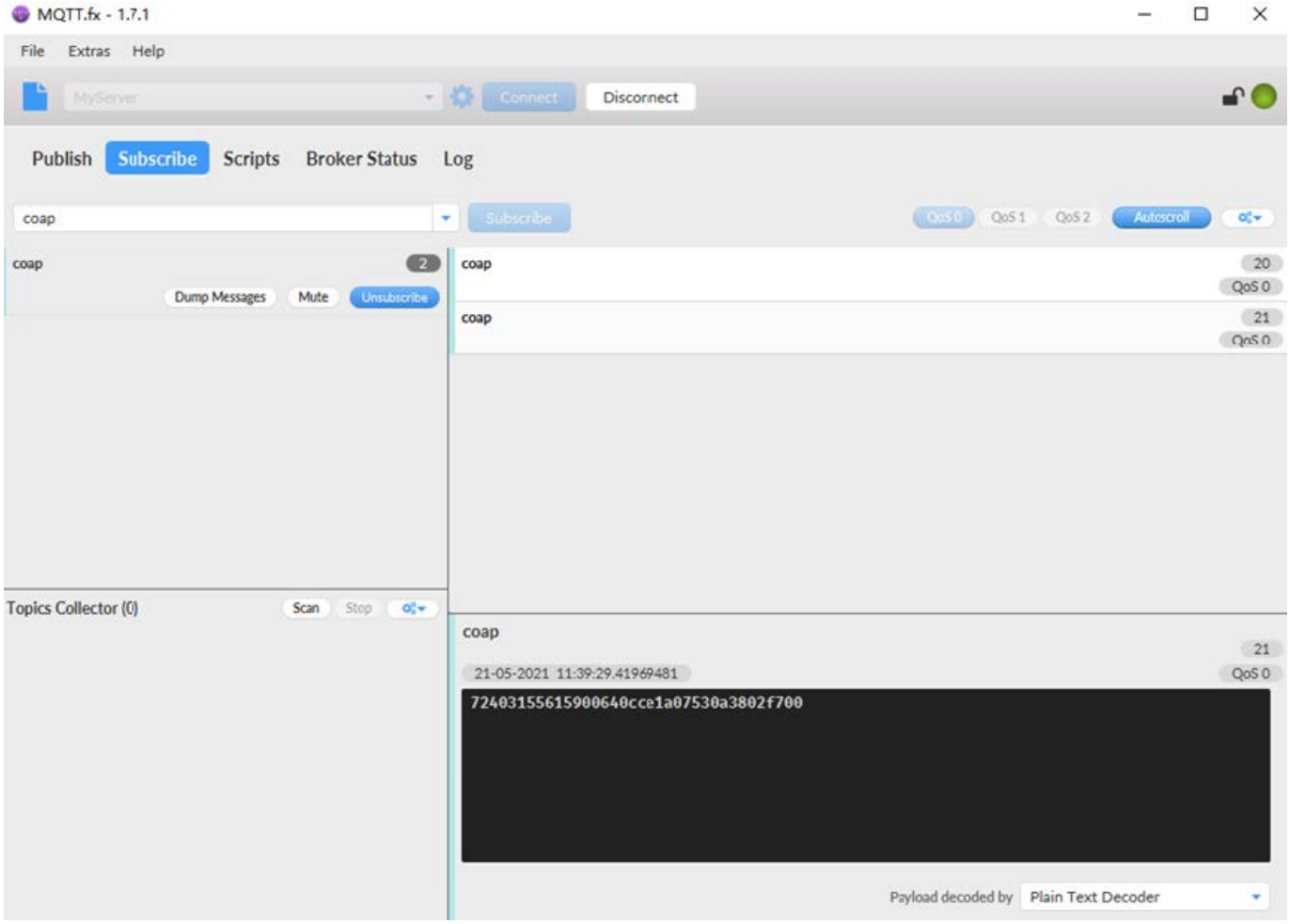
Use below commands:

- AT+PRO=1 // Set to use CoAP protocol to uplink
- AT+SERVADDR=120.24.4.116,5683 // to set CoAP server address and port
- AT+URI=5,11,"mqtt",11,"coap",12,"0",15,"c=text1",23,"0" //Set COAP resource path

For parameter description, please refer to AT command set



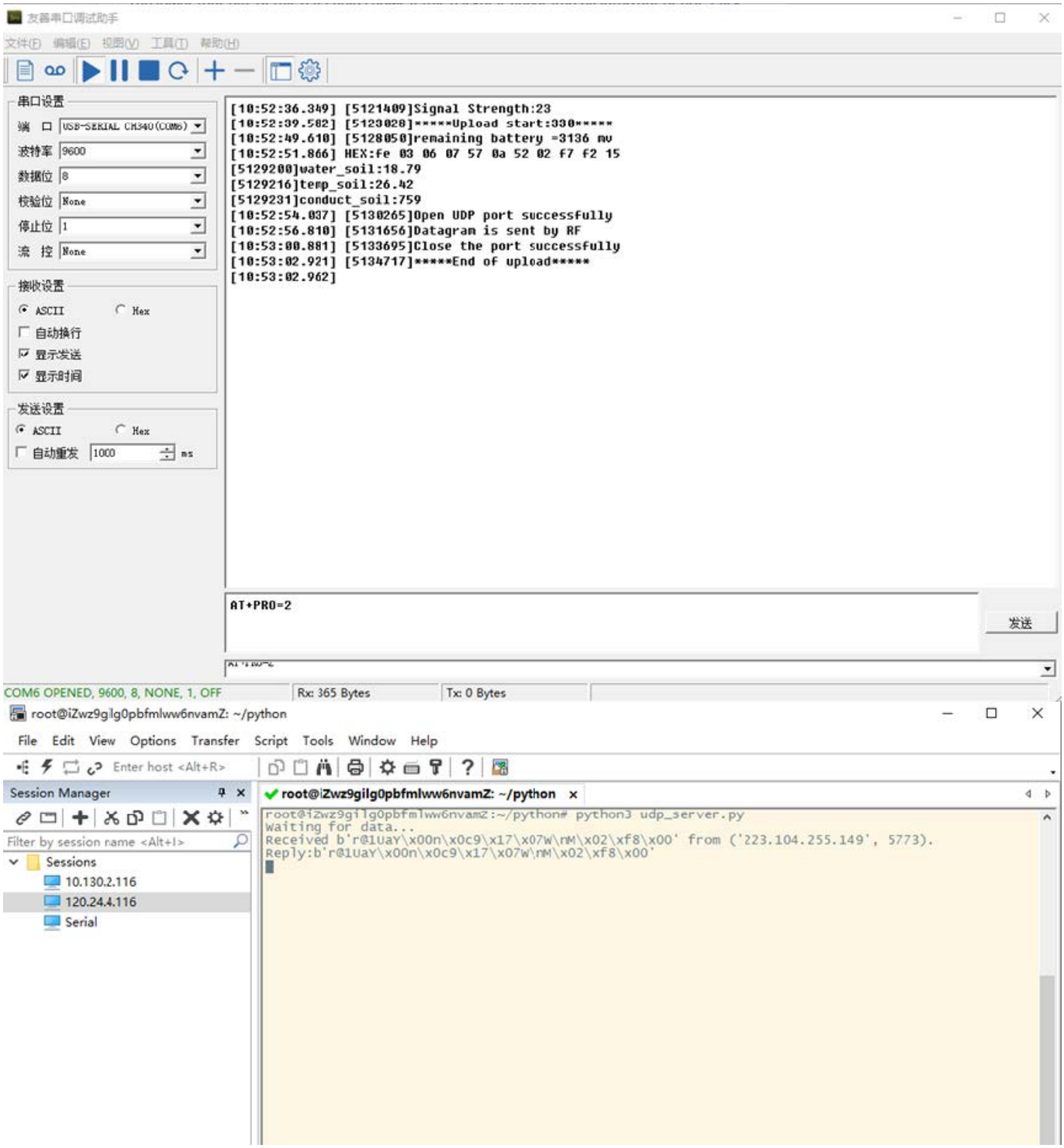
After configure the server address and reset the device (via AT+ATZ), NSE01 will start to uplink sensor values to CoAP server.



Use UDP protocol to uplink data(Default protocol)

This feature is supported since firmware version v1.0.1

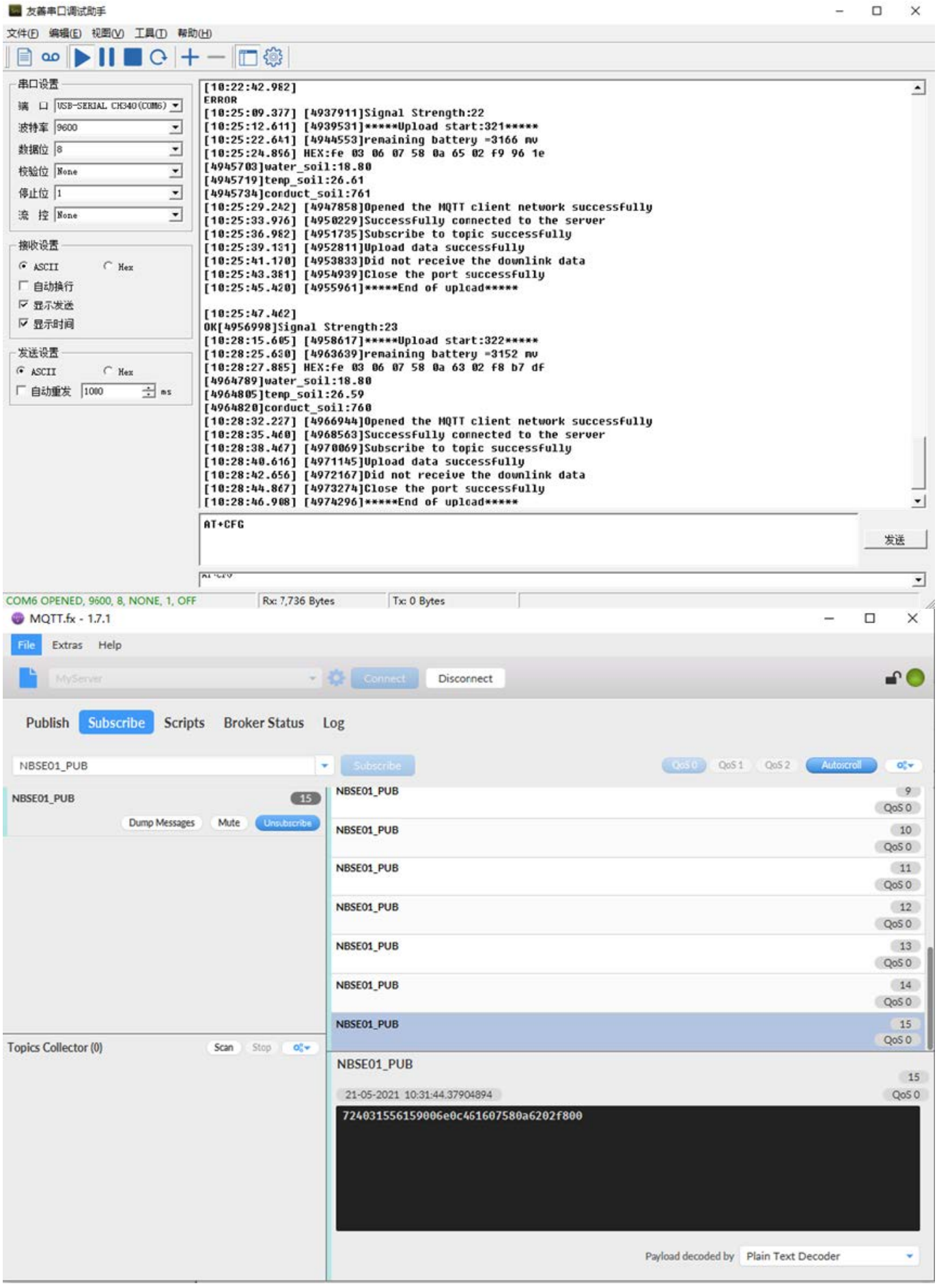
- AT+PRO=2 // Set to use UDP protocol to uplink
- AT+SERVADDR=120.24.4.116,5601 // to set UDP server address and port
- AT+CFM=1 //If the server does not respond, this command is unnecessary



Use MQTT protocol to uplink data
This feature is supported since firmware version v110

- AT+PRO=3 //Set to use MQTT protocol to uplink
- AT+SERVADDR=120.24.4.116,1883 //Set MQTT server address and port
- AT+CLIENT=CLIENT / / Set up the CLIENT of MQTT
- AT+UNAME=UNAME //Set the username of MQTT
- AT+PWD=PWD //Set the password of MQTT

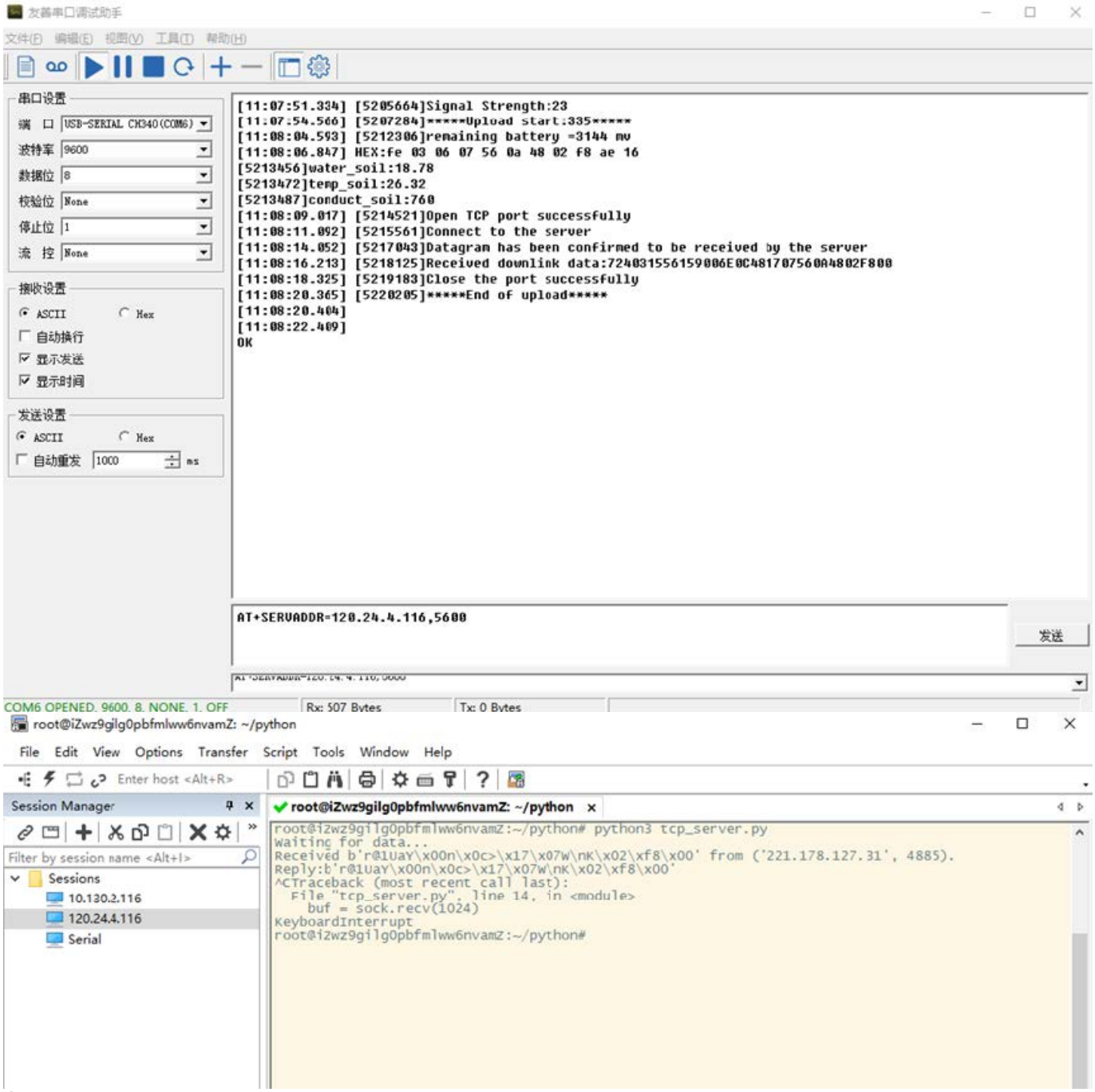
- AT+PUBTOPIC=NSE01_PUB //Set the sending topic of MQTT
- AT+SUBTOPIC=NSE01_SUB //Set the subscription topic of MQTT



MQTT protocol has a much higher power consumption compare vs UDP / CoAP protocol. Please check the power analyze document and adjust the uplink period to a suitable interval.

Use TCP protocol to uplink data
This feature is supported since firmware version v110

- AT+PRO=4 // Set to use TCP protocol to uplink
- AT+SERVADDR=120.24.4.116,5600 // to set TCP server address and port



Change Update Interval
User can use below command to change the uplink interval.

- AT+TDC=600 // Set Update Interval to 600s

NOTE :

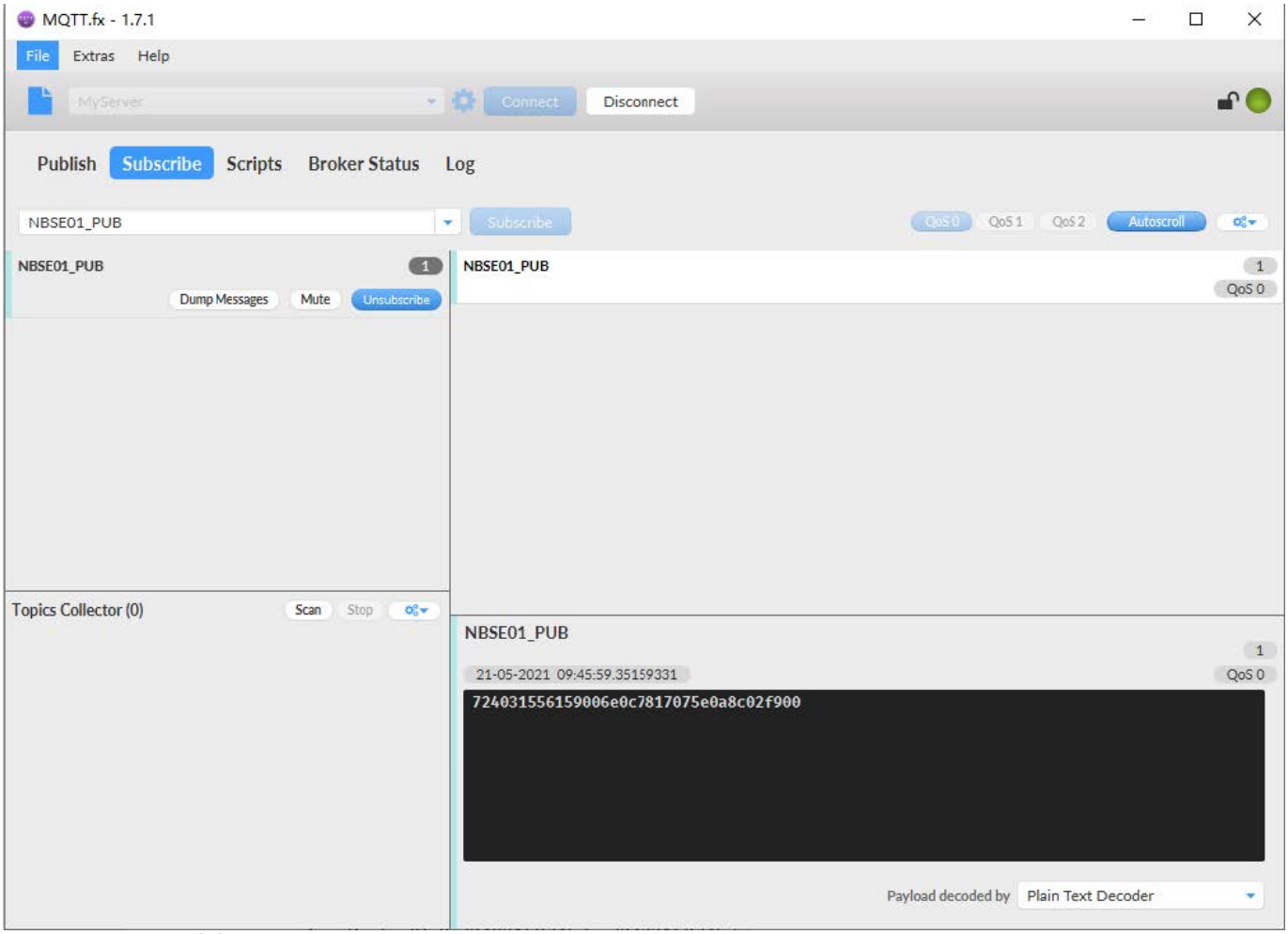
1. By default, the device will send an uplink message every 1 hour.
2. When the firmware version is v1.3.2 and later firmware:

By default, the device will send an uplink message every 2 hours. Each Uplink Include 8 set of records in this 2 hour (15 minute interval / record).

Uplink Payload
Before Firmware version v1.3.2
In this mode, uplink payload includes in total 18 bytes

Size(bytes)	6	2	2	1	2	2	2	1
Value	Device ID	Ver	BAT	Signal Strength	Soil Moisture	Soil Temperature	Soil Conductivity(EC)	Interrupt

If we use the MQTT client to subscribe to this MQTT topic, we can see the following information when the NSE01 uplink data.



The payload is ASCII string, representative same HEX: 0x72403155615900640c7817075e0a8c02f900 where:

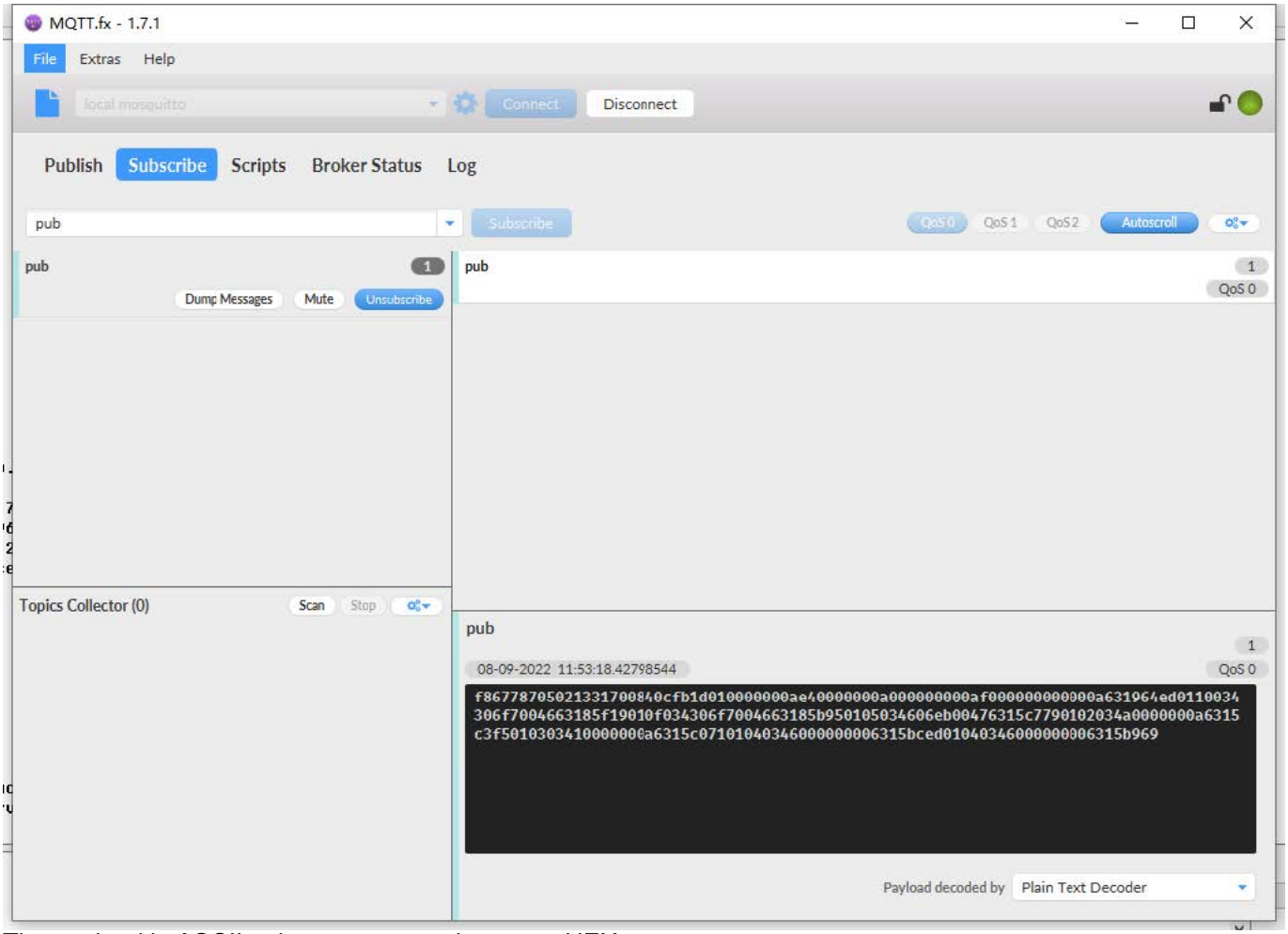
- Device ID: 0x 724031556159 = 724031556159
- Version: 0x0064=100=1.0.0
- BAT: 0x0c78 = 3192 mV = 3.192V
- Signal: 0x17 = 23
- Soil Moisture: 0x075e= 1886 = 18.86 %
- Soil Temperature: 0x0a8c =2700=27 °C
- Soil Conductivity(EC) 0x02f9 =761 uS /cm
- Interrupt: 0x00 = 0

Since Firmware version v1.3.2
In this mode, uplink payload includes 123 bytes in total by default.
Each time the device uploads a data package, 8 sets of recorded data will be attached. Up to 32 sets of recorded data can be uploaded.

Size(bytes)	8	2	2	1	1	1	2	2	2
Value	Device ID	Ver	BAT	Signal Strength	MOD	Interrupt	Soil Moisture	Soil Temperature	Soil Conductivity(EC)

2	4	2	2	2	2	4
Soil dielectric constant	Time stamp	Soil Temperature	Soil Moisture	Soil Conductivity(EC)	Soil dielectric constant	Time stamp .....

If we use the MQTT client to subscribe to this MQTT topic, we can see the following information when the NSE01 uplink data.



The payload is ASCII string, representative same HEX:

0x f867787050213317 0084 0cfd 1b 01 00 0000 0ae8 0000 000a 6315537b 0110034306f7004663185f19 010f034306f7004663185b95 0105034606eb00476315c779 0102034a0000000a6315c3f5 010303410000000a6315c071 0104034600000006315bced 0104034600000006315b969 0104034100000006315b5e5

where:

- Device ID: f867787050213317 = f867787050213317
- Version: 0x0084=132=1.3.2
- BAT: 0x0c78 = 3325 mV = 3.325V
- Singal: 0x1b = 27
- Mod: 0x01 = 1

- Interrupt: 0x00= 0
- Soil Moisture: 0x0000= 0 = 0
- Soil Temperature: 0x0ae8 =2795=27.95 °C
- Soil Conductivity(EC): 0000=0
- Soil dielectric constant: 000a=1
- Time stamp : 0x6315537b =1662342011 (Unix Epoch Time)
- Soil Temperature, Soil Moisture, Soil Conductivity(EC),Soil dielectric constant, Time stamp : 0110034306f7004663185f19
- 8 sets of recorded data: Soil Temperature ,Soil Moisture ,Soil Conductivity (EC),Soil dielectric constant, Time stamp : 010f034306f7004663185b95,…….

Payload Explanation and Sensor Interface

Device ID
By default, the Device ID equal to the last 6 bytes of IMEI.
User can use AT+DEUI to set Device ID

Example:
AT+DEUI= A84041F15612
The Device ID is stored in a none-erase area, Upgrade the firmware or run AT+FDR won't erase Device ID.

NOTE: When the firmware version is v1.3.2 and later firmware:
By default, the Device ID equal to the last 15 bits of IMEI.
User can use AT+DEUI to set Device ID
Example:
AT+DEUI= 868411056754138

Version Info
Specify the software version: 0x64=100, means firmware version 1.00.
For example: 0x00 64 : this device is NSE01 with firmware version 1.0.0.

Battery Info
Check the battery voltage for LSE01.
Ex1: 0x0B45 = 2885mV
Ex2: 0x0B49 = 2889mV

Signal Strength
NB-IoT Network signal Strength.

Ex1: 0x1d = 29
0 -113dBm or less
1 -111dBm
2…30 -109dBm… -53dBm
31 -51dBm or greater
99 Not known or not detectable

Soil Moisture
Get the moisture content of the soil. The value range of the register is 0-10000(Decimal), divide this value by 100 to get the percentage of moisture in the soil.
For example, if the data you get from the register is 0x05 0xDC, the moisture content in the soil is 05DC(H) = 1500(D) /100 = 15%.

Soil Temperature
Get the temperature in the soil. The value range of the register is -4000 – +800(Decimal), divide this value by 100 to get the temperature in the soil. For example, if the data you get from the register is 0x09 0xEC, the temperature content in the soil is **Example:**
If payload is 0105H: ((0x0105 & 0x8000)>>15 === 0),temp = 0105(H)/100 = 2.61 °C
If payload is FF7EH: ((FF7E & 0x8000)>>15 ===1),temp = (FF7E(H)-FFFF(H))/100 = -1.29 °C

Soil Conductivity (EC)
Obtain soluble salt concentration in soil or soluble ion concentration in liquid fertilizer or planting medium. The value range of the register is 0 – 20000(Decimal)(Can be greater than 20000).
For example, if the data you get from the register is 0x00 0xC8, the soil conductivity is 00C8(H) = 200(D) = 200 uS/cm.
Generally, the EC value of irrigation water is less than 800uS / cm.

Soil dielectric constant
Get the soil dielectric constant in the soil. The value range of the register is 10 – 800(Decimal)

For example, if the data you get from the register is 0x00 0xD2, the soil conductivity is 00D2(H) = 210(D) = 21.
Generally, the EC value of irrigation water is less than 21.

Digital Interrupt
Digital Interrupt refers to pin GPIO_EXTI, and there are different trigger methods. When there is a trigger, the NSE01 will send a packet to the server.

The command is:
AT+INTMOD=3 //(more info about INMOD please refer AT Command Manual).
The lower four bits of this data field shows if this packet is generated by interrupt or not. Click here for the hardware and software set up.

Example:
0x(00): Normal uplink packet.
0x(01): Interrupt Uplink Packet.

+5V Output
NSE01 will enable +5V output before all sampling and disable the +5v after all sampling.
The 5V output time can be controlled by AT Command.

AT+5VT=1000
Means set 5V valid time to have 1000ms. So the real 5V output will actually have 1000ms + sampling time for other sensors.

Downlink Payload
By default, NSE01 prints the downlink payload to console port.

Downlink Control Type	FPort	Type Code	Downlink payload size(bytes)
TDC (Transmit Time Interval)	Any	01	4
RESET	Any	04	2
INTMOD	Any	06	4

Examples:

- Set TDC

If the payload=0100003C, it means set the END Node's TDC to 0x00003C=60(S), while type code is 01.
Payload: 01 00 00 1E TDC=30S
Payload: 01 00 00 3C TDC=60S

- Reset

  If payload = 0x04FF, it will reset the NSE01
- INTMOD

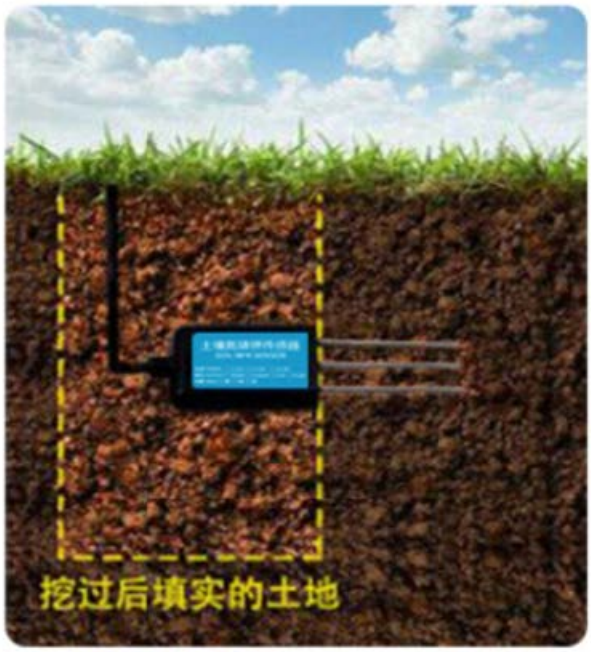
  Downlink Payload: 06000003, Set AT+INTMOD=3

LED Indicator
The NSE01 has an internal LED which is to show the status of different state.

- When power on, NSE01 will detect if sensor probe is connected, if probe detected, LED will blink four times.(no blinks in this step is no probe)
- Then the LED will be on for 1 second means device is boot normally.
- After NSE01 join NB-IoT network. The LED will be ON for 3 seconds.
- For each uplink probe, LED will be on for 500ms.

Installation in Soil
Measurement the soil surface
Choose the proper measuring position. Avoid the probe to touch rocks or hard things. Split the surface soil according to the measured deep. Keep the measured as original density. Vertical insert the probe into the soil to be measured. Make sure not shake when inserting.
https://img.alicdn.com/imgextra/i3/2005165265/O1CN010rj9Oh1olPsQxrdUK_!!2005165265.jpg

Dig a hole with diameter > 20CM.
Horizontal insert the probe to the soil and fill the hole for long term measurement.



Moisture and Temperature alarm function (Since Firmware 1.3.2)

 # AT Command:
AT+ HUMALARM=min,max
² When min=0, and max≠0, Alarm higher than max
² When min≠0, and max=0, Alarm lower than min
² When min≠0 and max≠0, Alarm higher than max or lower than min

Example:
AT+ HUMALARM =50,80 // Alarm when moisture lower than 50.
AT+ TEMPALARM=min,max
² When min=0, and max≠0, Alarm higher than max
² When min≠0, and max=0, Alarm lower than min
² When min≠0 and max≠0, Alarm higher than max or lower than min

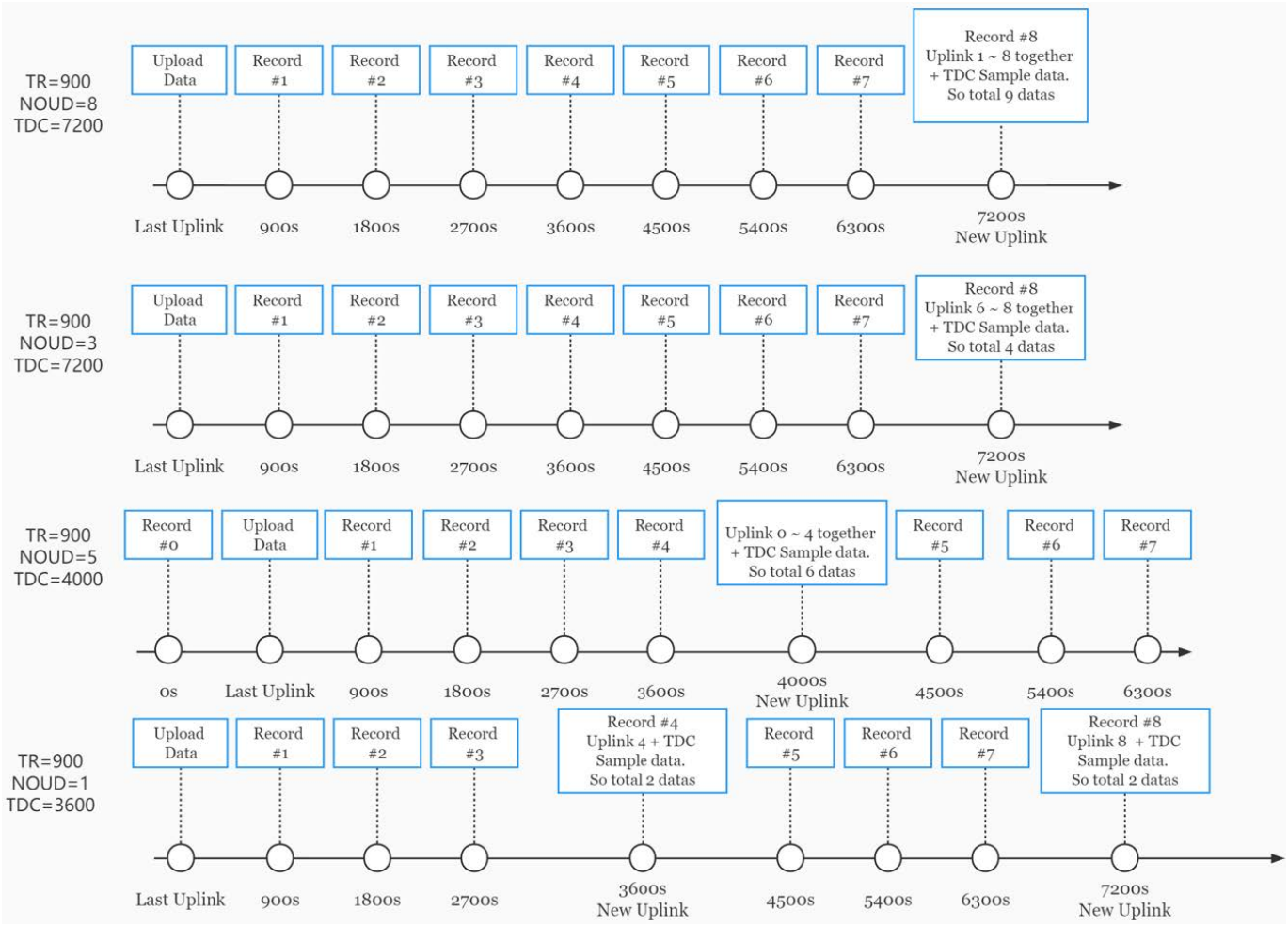
Example:
AT+ TEMPALARM=20,30 // Alarm when temperature lower than 20.

Set the number of data to be uploaded and the recording time

 # AT Command:

- AT+TR=900 // The unit is seconds, and the default is to record data once every 900 seconds.(The minimum can be set to 180 seconds)
- AT+NOUD=8 // The device uploads 8 sets of recorded data by default. Up to 32 sets of record data can be uploaded.

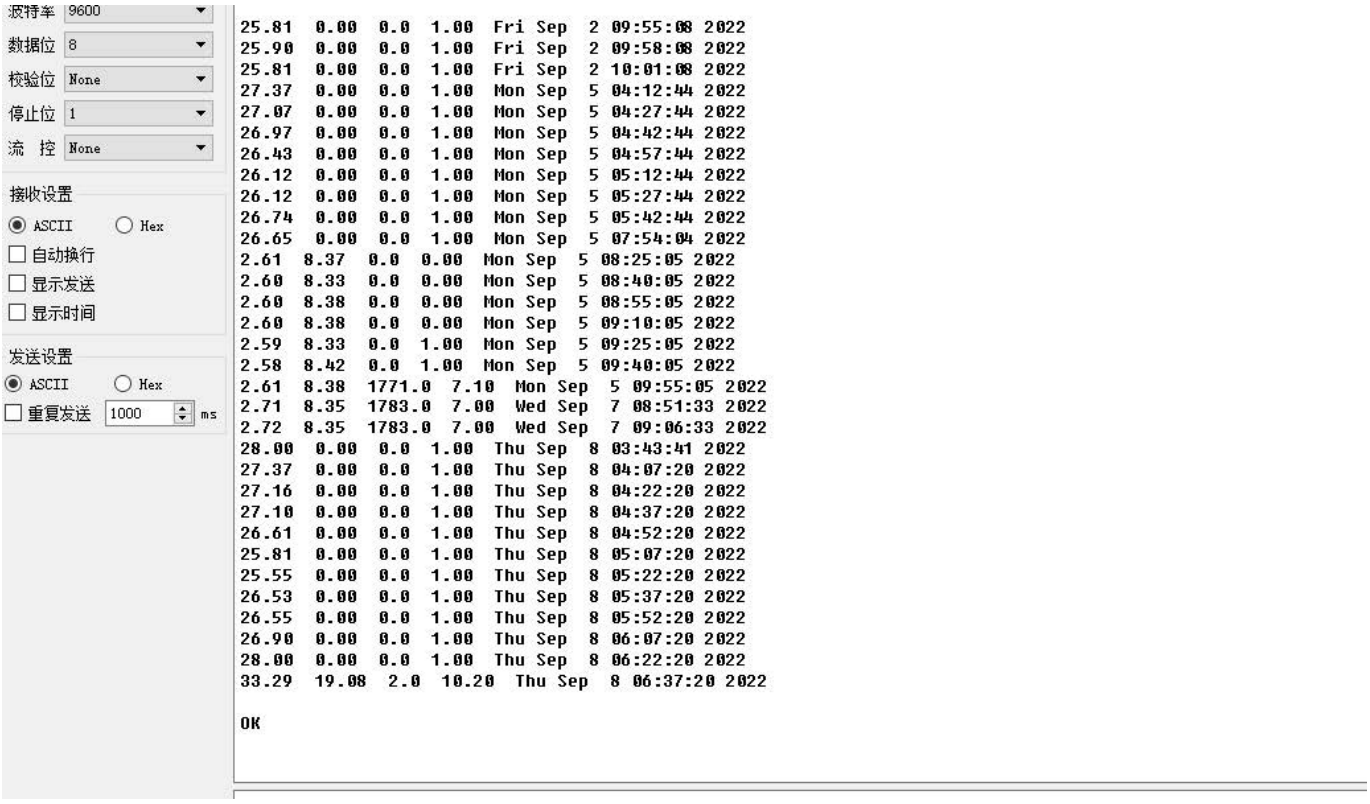
The diagram below explains the relationship between TR, NOUD, and TDC more clearly:



Read or Clear cached data

AT Command:

- AT+CDP // Read cached data
- AT+CDP=0 // Clear cached data



Firmware Change Log
Download URL & Firmware Change log: **https://www.dropbox.com/sh/1zmcakvbkf24f8x/AACmq2dZ3iRB9F1nVWeEB9Moa?dl=0**

Upgrade Instruction: Upgrade Firmware

Battery Analysis
Battery Type
The NSE01 battery is a combination of an 8500mAh Li/SOCI2 Battery and a Super Capacitor. The battery is none-rechargeable battery type with a low discharge rate (<2% per year). This type of battery is commonly used in IoT devices such as water meter.

The battery is designed to last for several years depends on the actually use environment and update interval.

The battery related documents as below:

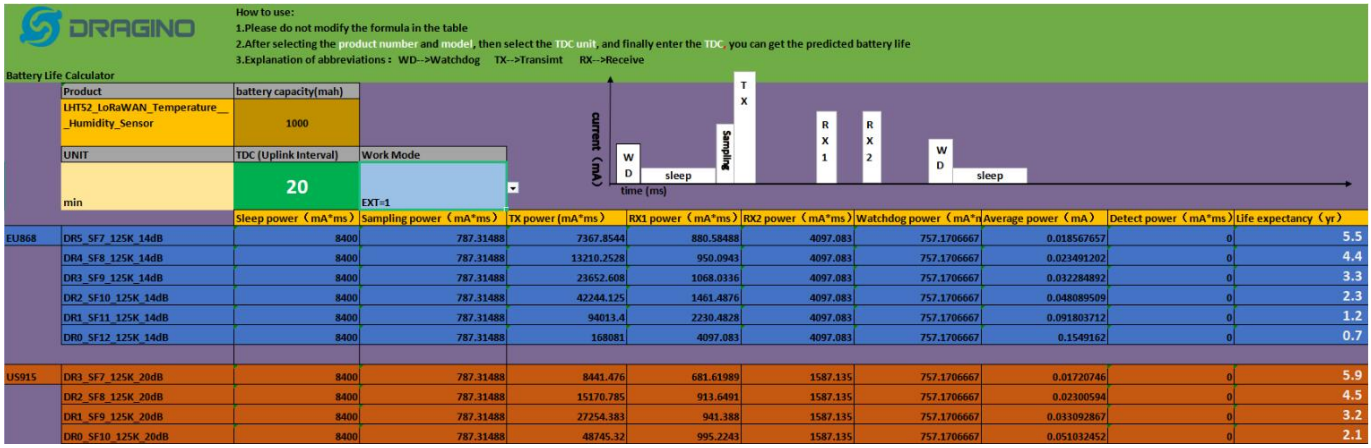
- Battery Dimension
- Lithium-Thionyl Chloride Battery datasheet
- Lithium-ion Battery-Capacitor datasheet

Power consumption Analyze
Dragino battery powered product are all runs in Low Power mode. We have an update battery calculator which base on the measurement of the real device. User can use this calculator to check the battery life and calculate the battery life if want to use different transmit interval.

Instruction to use as below:
Step 1: Downlink the up-to-date DRAGINO_Battery_Life_Prediction_Table.xlsx from: https://www.dragino.com/downloads/index.php?dir=LoRa_End_Node/Battery_Analyze/
Step 2: Open it and choose

- Product Model
- Uplink Interval
- Working Mode

And the Life expectation in difference case will be shown on the right.



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How to use:
1.Please do not modify the formula in the table
2.After selecting the product number and model, then select the TDC unit, and finally enter the TDC, you can get the predicted battery life
3.Explanation of abbreviations： WD-->Watchdog TX-->Transimt RX-->Receive

Battery Life Calculator

Product	battery capacity(mah)
LHT52_LoRaWAN_Temperature__Humidity_Sensor	1000

UNIT	TDC (Uplink Interval)	Work Mode
min	20	EXT=1

		Sleep power （mA*ms）	Sampling power （mA*ms）	TX power (mA*ms）	RX1 power （mA*ms）	RX2 power （mA*ms）	Watchdog power （mA*m	Average power （mA）	Detect power （mA*ms）	Life expectancy （yr）
EU868	DR5_SF7_125K_14dB	8400	787.31488	7367.8544	880.58488	4097.083	757.1706667	0.018567657	0	5.5
	DR4_SF8_125K_14dB	8400	787.31488	13210.2528	950.0943	4097.083	757.1706667	0.023491202	0	4.4
	DR3_SF9_125K_14dB	8400	787.31488	23652.608	1068.0336	4097.083	757.1706667	0.032284892	0	3.3
	DR2_SF10_125K_14dB	8400	787.31488	42244.125	1461.4876	4097.083	757.1706667	0.048089509	0	2.3
	DR1_SF11_125K_14dB	8400	787.31488	94013.4	2230.4828	4097.083	757.1706667	0.091803712	0	1.2
	DR0_SF12_125K_14dB	8400	787.31488	168081	4097.083	4097.083	757.1706667	0.1549162	0	0.7
US915	DR3_SF7_125K_20dB	8400	787.31488	8441.476	681.61989	1587.135	757.1706667	0.01720746	0	5.9
	DR2_SF8_125K_20dB	8400	787.31488	15170.785	913.6491	1587.135	757.1706667	0.02300594	0	4.5
	DR1_SF9_125K_20dB	8400	787.31488	27254.383	941.388	1587.135	757.1706667	0.033092867	0	3.2
	DR0_SF10_125K_20dB	8400	787.31488	48745.32	995.2243	1587.135	757.1706667	0.051032452	0	2.1

Battery Note

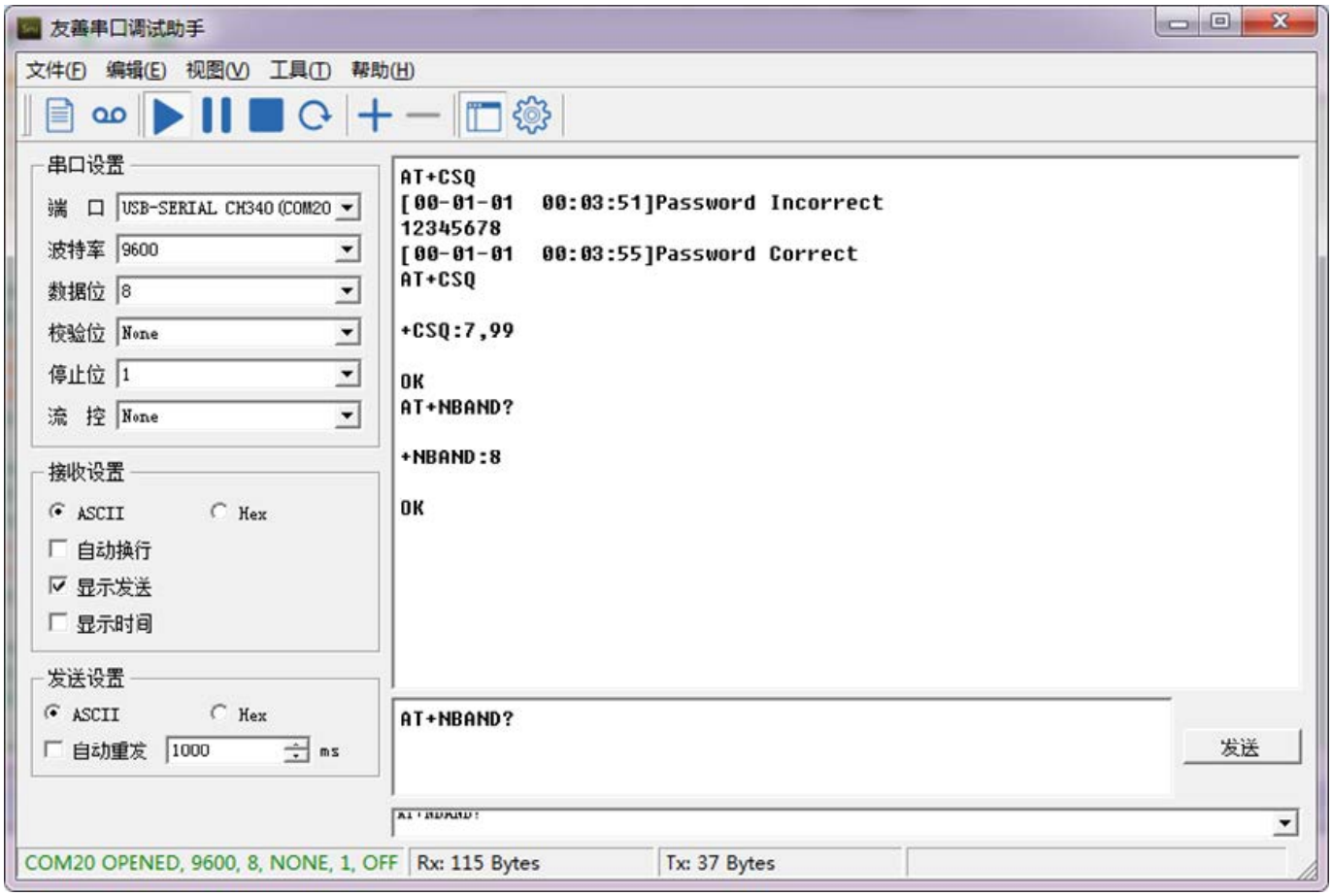
The Li-SICO battery is designed for small current / long period application. It is not good to use a high current, short period transmit method. The recommended minimum period for use of this battery is 5 minutes. If you use a shorter period time to transmit LoRa, then the battery life may be decreased.

Replace the battery

The default battery pack of NSE01 includes a ER26500 plus super capacitor. If user can't find this pack locally, they can find ER26500 or equivalence without the SPC1520 capacitor, which will also work in most case. The SPC can enlarge the battery life for high frequency use (update period below 5 minutes).

Access NB-IoT Module

Users can directly access the AT command set of the NB-IoT module.
The AT Command set can refer the BC35-G NB-IoT Module AT Command: https://www.dragino.com/downloads/index.php?dir=datasheet/other_vendors/BC35-G/



Using the AT Commands

Access AT Commands

See this link for detail: **https://www.dropbox.com/sh/351dwor6joz8nwh/AADn1BQaAAxLF_QMyU8NkW47a?dl=0**

- AT+<CMD>? : Help on <CMD>
- AT+<CMD> : Run <CMD> AT+<CMD>=<value> : Set the value

General Commands

- AT : Attention
- AT? : Short Help
- ATZ : MCU Reset
- AT+TDC : Application Data Transmission Interval
- AT+CFG : Print all configurations
- AT+CFGMOD : Working mode selection
- AT+INTMOD : Set the trigger interrupt mode
- AT+5VT : Set extend the time of 5V power
- AT+PRO : Choose agreement
- AT+RXDL : Extend the sending and receiving time
- AT+SERVADDR : Server Address
- AT+TR : Get or Set record time”
- AT+APN : Get or set the APN
- AT+FBAND : Get or Set whether to automatically modify the frequency band
- AT+DNSCFG : Get or Set DNS Server
- AT+GETSENSORVALUE : Returns the current sensor measurement
- AT+NOUD : Get or Set the number of data to be uploaded
- AT+CDP : Read or Clear cached data
- AT+TEMPALARM : Get or Set alarm of temp
- AT+HUMALARM : Get or Set alarm of moisture

COAP Management

- AT+URI : Resource parameters

UDP Management

- AT+CFM : Upload confirmation mode (only valid for UDP)

MQTT Management

- AT+CLIENT : Get or Set MQTT client
- AT+UNAME : Get or Set MQTT Username
- AT+PWD : Get or Set MQTT password

- AT+PUBTOPIC : Get or Set MQTT publish topic
- AT+SUBTOPIC : Get or Set MQTT subscription topic

Information

- AT+FDR : Factory Data Reset
- AT+PWORD : Serial Access Password

A / Q

- **How to Upgrade Firmware**
  User can upgrade the firmware for 1) bug fix, 2) new feature release.
  Please see this link for how to
  upgrade: http://wiki.dragino.com/xwiki/bin/view/Main/Firmware%20Upgrade%20Instruction%20for%20STM
  Notice, NSE01 and LSE01 share the same mother board. They use the same connection and method to update.
- **Can I calibrate NSE01 to different soil types?**
  NSE01 is calibrated for saline-alkali soil and loamy soil. If users want to use it for other soil, they can calibrate the value in the IoT platform base on the value measured by saline-alkali soil and loamy soil. The formula can be found at this link.

Trouble Shooting

Connection problem when uploading firmware
Please see:
http://wiki.dragino.com/xwiki/bin/view/Main/Firmware%20Upgrade%20Instruction%20for%20STM32%20base%20products/#H3.3Troubleshooting

AT Command input doesn't work
In the case if user can see the console output but can't type input to the device. Please check if you already include the ENTER while sending out the command. Some serial tool doesn't send ENTER while press the send key, user need to add ENTER in their string.

Order Info

Part Number: NSE01

Product Packing Info

Package Includes:

- NSE01 NB-IoT Soil Moisture & EC Sensor x 1
- External antenna x 1

Dimension and weight:

- Size: 195 x 125 x 55 mm

- Weight: 420g

Support

- Support is provided Monday to Friday, from 09:00 to 18:00 GMT+8. Due to different time zones we cannot offer live support. However, your questions will be answered as soon as possible in the before-mentioned schedule.
- Provide as much information as possible regarding your enquiry (product models, accurately describe your problem and steps to replicate it etc) and send a mail to **support@dragino.com**

Documents / Resources

	**DRAGINO NSE01 NB-IoT Soil Moisture and EC Sensor** [pdf] User Manual NSE01, NSE01 NB-IoT Soil Moisture and EC Sensor, NB-IoT Soil Moisture and EC Sensor, Soil Moisture and EC Sensor, EC Sensor

References

- **Home - DRAGINO**
- **Dragino :: Open Source WiFi, Linux Appliance**
- **Dragino Download Server ./downloads/**
- **Dragino Download Server ./downloads/LSN50-LoRaST/Mechanical_Drawing/**
- **Dropbox - NSE01 - Simplify your life**