
DDS20-NB -- NB-IoT Ultrasonic Liquid Level Sensor User Manual

Version 189.1 authored by  [Mengting Qiu](#) on 2026/01/23 09:36

Table of Contents

1. Introduction	7
1.1 What is DDS20-NB NB-IoT Ultrasonic liquid level Sensor	7
1.2 Features	7
1.3 Specification	8
1.4 Suitable Container & Liquid	9
1.5 Install DDS20-NB	9
1.6 Applications	11
1.7 Precautions	11
1.8 Sleep mode and working mode	12
1.9 Button & LEDs	12
1.10 BLE connection	13
1.11 Pin Definitions , Switch & SIM Direction	13
1.11.1 Jumper JP2	14
1.11.2 BOOT MODE / SW1	14
1.11.3 Reset Button	14
1.11.4 SIM Card Direction	14
1.12 Mechanical	15

2. Use DDS20-NB to communicate with IoT Server	16
2.1 Send data to IoT server via NB-IoT network	16
2.2 Payload Types	17
2.2.1 General Json Format(Type=5)	18
2.2.2 HEX format Payload(Type=0)	19
2.2.3 ThingsBoard Payload(Type=3)	20
2.2.4 ThingSpeak Payload(Type=1)	21
2.3 Test Uplink and Change Update Interval	21
2.4 Multi-Samplings and One uplink	21
2.5 Trggier an uplink by external interrupt	22
2.6 Clock logging (Since firmware version v1.2.1)	23
2.7 Datalog Function(Since firmware version v1.3.4)	24
2.7.1 Unix TimeStamp	24
2.7.2 Poll sensor value	25
2.7.3 Datalog Uplink payload	25
2.8 Example Query saved historical records	27
2.9 Uplink log query	27
2.10 Scheduled domain name resolution	28
2.11 Set the QoS level	28
2.12 Distance Alarm	29
2.13 Set the downlink debugging mode(Since firmware v1.3.0)	29
2.14 Domain name resolution settings(Since firmware v1.3.0)	29
2.15 Set CoAP option	30
2.16 Print last few data entries(Since firmware v1.3.4)	31
2.17 Print data entries base on page(Since firmware v1.3.4)	31
2.18 Clear Flash Record(Since firmware v1.3.4)	32
3. Configure DDS20-NB	33
3.1 Configure Methods	33
3.2 Serial Access Password	33
3.3 AT Commands Set	36
4. Battery & Power Consumption	37
5. Firmware update	37

6. FAQ	38
6.1 How can I access t BC660K-GL AT Commands?	38
6.2 How to configure the certificate?	38
6.3 Why i always see 0x0000 or 0 for the distance value?	38
6.4 Why is there no LED response when I press the button on the solar panel model?	38
7. Order Info	38
8. Packing Info	39
9. Support	39



Table of Contents:

- [1. Introduction](#)
 - [1.1 What is DDS20-NB NB-IoT Ultrasonic liquid level Sensor](#)
 - [1.2 Features](#)
 - [1.3 Specification](#)
 - [1.4 Suitable Container & Liquid](#)
 - [1.5 Install DDS20-NB](#)
 - [1.6 Applications](#)
 - [1.7 Precautions](#)
 - [1.8 Sleep mode and working mode](#)
 - [1.9 Button & LEDs](#)
 - [1.10 BLE connection](#)
 - [1.11 Pin Definitions , Switch & SIM Direction](#)
 - [1.11.1 Jumper JP2](#)
 - [1.11.2 BOOT MODE / SW1](#)
 - [1.11.3 Reset Button](#)
 - [1.11.4 SIM Card Direction](#)
 - [1.12 Mechanical](#)
- [2. Use DDS20-NB to communicate with IoT Server](#)
 - [2.1 Send data to IoT server via NB-IoT network](#)
 - [2.2 Payload Types](#)
 - [2.2.1 General Json Format\(Type=5\)](#)
 - [2.2.2 HEX format Payload\(Type=0\)](#)
 - [2.2.3 ThingsBoard Payload\(Type=3\)](#)
 - [2.2.4 ThingSpeak Payload\(Type=1\)](#)
 - [2.3 Test Uplink and Change Update Interval](#)
 - [2.4 Multi-Samplings and One uplink](#)
 - [2.5 Triggier an uplink by external interrupt](#)
 - [2.6 Clock logging_\(Since firmware version v1.2.1\)](#)
 - [2.7 Datalog Function\(Since firmware version v1.3.4\)](#)
 - [2.7.1 Unix TimeStamp](#)
 - [2.7.2 Poll sensor value](#)
 - [2.7.3 Datalog Uplink payload](#)
 - [2.8 Example Query saved historical records](#)
 - [2.9 Uplink log_query.](#)
 - [2.10 Scheduled domain name resolution](#)
 - [2.11 Set the QoS level](#)
 - [2.12 Distance Alarm](#)
 - [2.13 Set the downlink debugging_mode\(Since firmware v1.3.0\)](#)
 - [2.14 Domain name resolution settings\(Since firmware v1.3.0\)](#)
 - [2.15 Set CoAP option](#)
 - [2.16 Print last few data entries\(Since firmware v1.3.4\)](#)
 - [2.17 Print data entries base on page\(Since firmware v1.3.4\)](#)
 - [2.18 Clear Flash Record\(Since firmware v1.3.4\)](#)
- [3. Configure DDS20-NB](#)
 - [3.1 Configure Methods](#)
 - [3.2 Serial Access Password](#)
 - [3.3 AT Commands Set](#)

- [4. Battery & Power Consumption](#)
- [5. Firmware update](#)
- [6. FAQ](#)
 - [6.1 How can I access t BC660K-GL AT Commands?](#)
 - [6.2 How to configure the certificate?](#)
 - [6.3 Why i always see 0x0000 or 0 for the distance value?](#)
 - [6.4 Why is there no LED response when I press the button on the solar panel model?](#)
- [7. Order Info](#)
- [8. Packing Info](#)
- [9. Support](#)

1. Introduction

1.1 What is DDS20-NB NB-IoT Ultrasonic liquid level Sensor

The Dragino DDS20-NB is a **NB-IoT Ultrasonic liquid level sensor** for Internet of Things solution. It uses **none-contact method** to measure the **height of liquid** in a container without opening the container, and send IoT platform via NB-IoT network.

The DDS20-NB sensor is installed directly below the container to detect the height of the liquid level. User doesn't need to open a hole on the container to be tested. The none-contact measurement makes the measurement safety, easier and possible for some strict situation.

DDS20-NB uses **ultrasonic sensing technology** for distance measurement. DDS20-NB is of high accuracy to measure various liquid such as: **toxic substances, strong acids, strong alkalis** and **various pure liquids** in high-temperature and high-pressure airtight containers.

DDS20-NB supports different uplink methods including **MQTT, MQTTs, UDP, TCP & COAP** for different application requirement, and support uplinks to various IoT Servers.

DDS20-NB **supports BLE configure** and **OTA update** which make user easy to use.

DDS20-NB is powered by **8500mAh Li-SOCI2 battery**, it is designed for long-term use up to several years.

DDS20-NB has optional built-in SIM card and default IoT server connection version. Which makes it works with simple configuration.

1.2 Features

- NB-IoT Bands: B1/B2/B3/B4/B5/B8/B12/B13/B17/B18/B19/B20/B25/B28/B66/B70/B85 @H-FDD
- Ultra-low power consumption
- Liquid Level Measurement by Ultrasonic technology
- Measure through container, No need to contact Liquid
- Valid level range 20mm - 2000mm
- Accuracy: $\pm(5\text{mm}+S*0.5\%)$ (S: Measure Value)

- Multiply Sampling and one uplink
- Support Bluetooth v5.1 remote configure and update firmware
- Uplink on periodically
- Downlink to change configure
- IP66 Waterproof Enclosure
- 8500mAh Battery for long term use
- Nano SIM card slot for NB-IoT SIM

1.3 Specification

Common DC Characteristics:

- Supply Voltage: 2.5v ~ 3.6v
- Operating Temperature: -40 ~ 85°C

NB-IoT Spec:

NB-IoT Module: BC660K-GL

Support Bands:

- B1 @H-FDD: 2100MHz
- B2 @H-FDD: 1900MHz
- B3 @H-FDD: 1800MHz
- B4 @H-FDD: 2100MHz
- B5 @H-FDD: 860MHz
- B8 @H-FDD: 900MHz
- B12 @H-FDD: 720MHz
- B13 @H-FDD: 740MHz
- B17 @H-FDD: 730MHz
- B18 @H-FDD: 870MHz
- B19 @H-FDD: 870MHz
- B20 @H-FDD: 790MHz
- B25 @H-FDD: 1900MHz
- B28 @H-FDD: 750MHz
- B66 @H-FDD: 2000MHz
- B70 @H-FDD: 2000MHz
- B85 @H-FDD: 700MHz

Battery:

- Li/SOCI2 un-chargeable battery
- Capacity: 8500mAh
- Self Discharge: <1% / Year @ 25°C
- Max continuously current: 130mA
- Max boost current: 2A, 1 second

Power Consumption

- STOP Mode: 10uA @ 3.3v
- Max transmit power: 350mA@3.3v

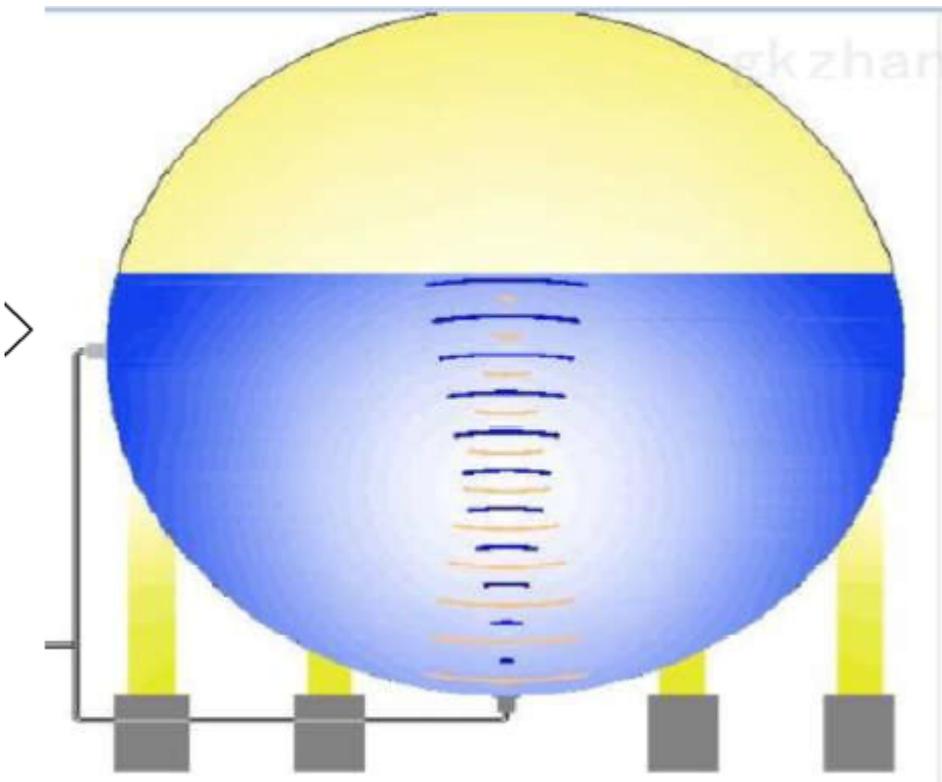
1.4 Suitable Container & Liquid

- Solid Wall container such as: steel, iron, glass, ceramics, non-foaming plastics etc.
- Container shape is regular, and surface is smooth.
- Container Thickness:
 - Pure metal material. 2~8mm, best is 3~5mm
 - Pure non metal material: <10 mm
- Pure liquid without irregular deposition.

1.5 Install DDS20-NB

Step 1: Choose the installation point.

DDS20-NB **MUST** be installed on the container bottom middle position.



Step 2: Polish the installation point.

For Metal Surface with paint, it is important to polish the surface, first use crude sand paper to polish the paint level, then use exquisite sand paper to polish the metal level to make it shine & smooth.



Metal Surface with paint needs polish

No polish needed if the container is shine metal surface without paint or non-metal container.



Shine Metal Surface without paint
no need polish

Step3: Test the installation point.

Power on DDS20-NB, check if the blue LED is on, If the blue LED is on, means the sensor works. Then put ultrasonic coupling paste on the sensor and put it tightly on the installation point.

It is necessary to put the coupling paste between the sensor and the container, otherwise DDS20-NB won't detect the liquid level.

After paste the DDS20-NB well, power on DDS20-NB. In the first 30 seconds of booting, device will check the sensors status and BLUE LED will show the status as below. After 30 seconds, BLUE LED will be off to save battery life.

LED Status:

- **Onboard LED:** When power on device, the onboard LED will fast blink 4 times which means detect the sensor well.
- **BLUE LED always ON:** Sensor is power on but doesn't detect liquid. There is problem in installation point.
- **BLUE LED slowly blinking:** Sensor detects Liquid Level, The installation point is good.

DDS20-NB will enter into low power mode at 30 seconds after system reset or power on, Blue LED will be off after that.

Note : Ultrasonic coupling paste is subjected in most shipping way. So the default package doesn't include it and user needs to purchase locally.

Step4: Install use Epoxy ab glue.

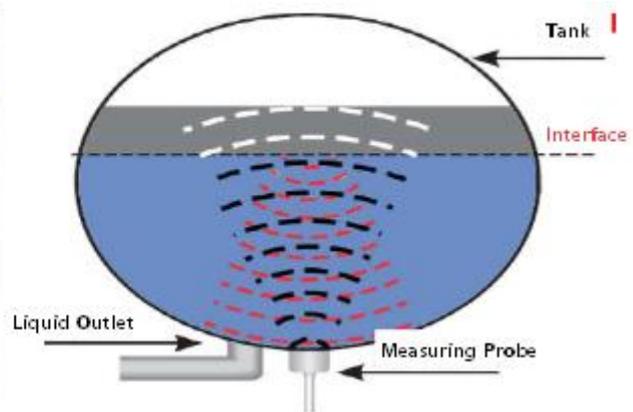
After ensuring that the ultrasonic coupling paste is applied to the sensor and adheres closely to the mounting point, and the sensor can work normally, add AB epoxy glue.

(**Note** :The ultrasonic coupling agent is used to help the sensor detect the liquid in the container, and the epoxy AB glue is used to fix the probe. Both need to be used at the same time.)

Prepare Epoxy AB glue.

Put Epoxy AB glue in the sensor and press it hard on the container installation point.

Reset DDS20-NB and see if the BLUE LED is slowly blinking.



Note :

1: Epoxy AB glue needs 3~ 5 minutes to stable attached. we can use other glue material to keep it in the position.

2: Epoxy AB glue is subjected in most shipping way. So the default package doesn't include it and user needs to purchase locally.

1.6 Applications

- Smart liquid control solution
- Smart liquefied gas solution

1.7 Precautions

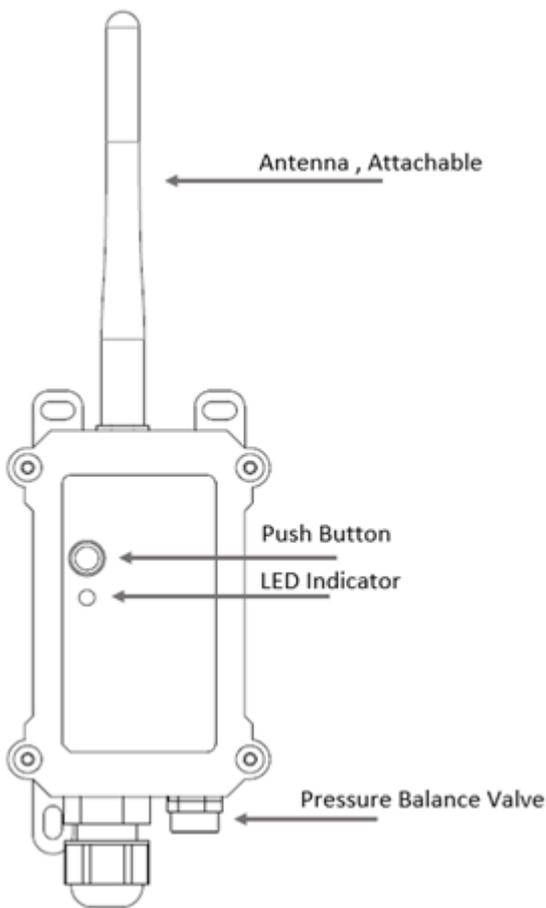
- At room temperature, containers of different materials, such as steel, glass, iron, ceramics, non-foamed plastics and other dense materials, have different detection blind areas and detection limit heights.
- For containers of the same material at room temperature, the detection blind zone and detection limit height are also different for the thickness of the container.
- When the detected liquid level exceeds the effective detection value of the sensor, and the liquid level of the liquid to be measured shakes or tilts, the detected liquid height is unstable.

1.8 Sleep mode and working mode

Deep Sleep Mode: Sensor doesn't have any NB-IoT activate. This mode is used for storage and shipping to save battery life.

Working Mode: In this mode, Sensor will work as NB-IoT Sensor to Join NB-IoT network and send out sensor data to server. Between each sampling/tx/rx periodically, sensor will be in IDLE mode), in IDLE mode, sensor has the same power consumption as Deep Sleep mode.

1.9 Button & LEDs



Behavior on ACT	Function	Action
-----------------	----------	--------

	Send an uplink	<p>If sensor has already attached to NB-IoT network, sensor will send an uplink packet, blue led will blink once.</p> <p>Meanwhile, BLE module will be active and user can connect via BLE to configure device.</p>
	Active Device	<p>Green led will fast blink 5 times, device will enter OTA mode for 3 seconds. And then start to attach NB-IoT network.</p> <p>Once sensor is active, BLE module will be active and user can connect via BLE to configure device, no matter if device attach NB-IoT network or not.</p>
	Deactivate Device	<p>Red led will solid on for 5 seconds. Means device is in Deep Sleep Mode.</p>

Note: When the device is executing a program, the buttons may become invalid. It is best to press the buttons after the device has completed the program execution.

1.10 BLE connection

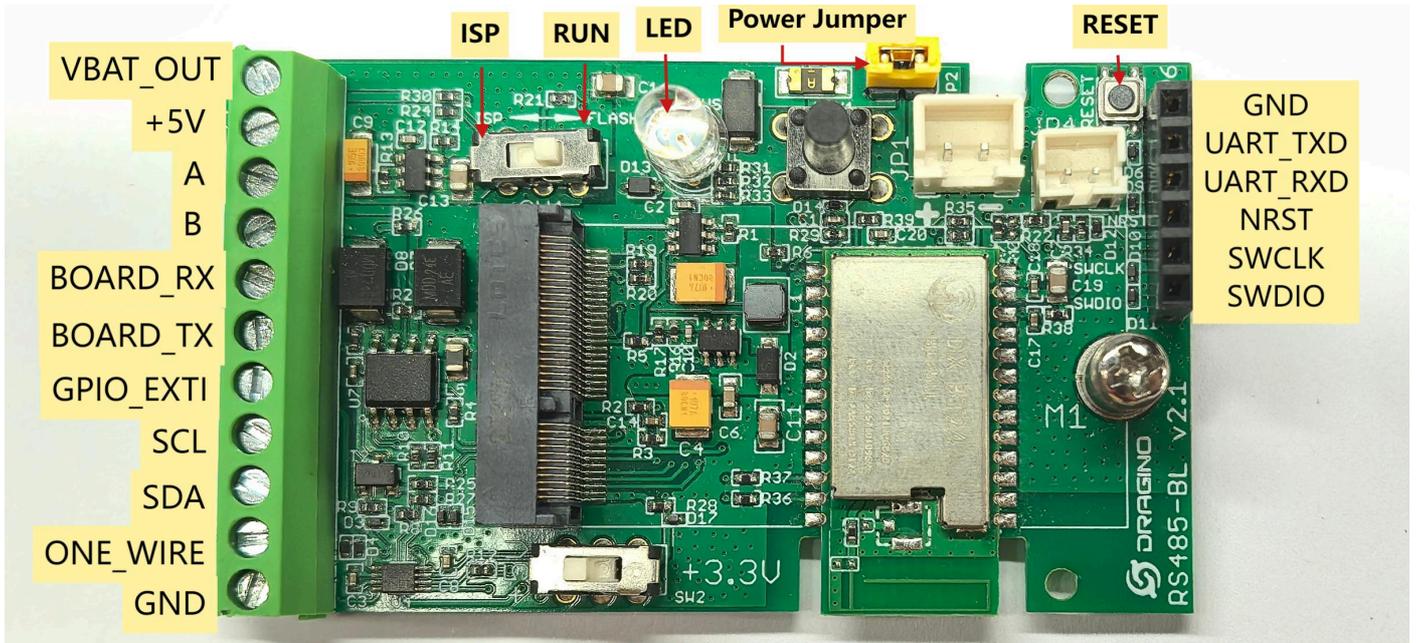
DDS20-NB support BLE remote configure and firmware update.

BLE can be used to configure the parameter of sensor or see the console output from sensor. BLE will be only activate on below case:

- Press button to send an uplink
- Press button to active device.
- Device Power on or reset.

If there is no activity connection on BLE in 60 seconds, sensor will shut down BLE module to enter low power mode.

1.11 Pin Definitions , Switch & SIM Direction



1.11.1 Jumper JP2

Power on Device when put this jumper.

1.11.2 BOOT MODE / SW1

- 1) **ISP**: upgrade mode, device won't have any signal in this mode. but ready for upgrade firmware. LED won't work. Firmware won't run.
- 2) **Flash**: work mode, device starts to work and send out console output for further debug

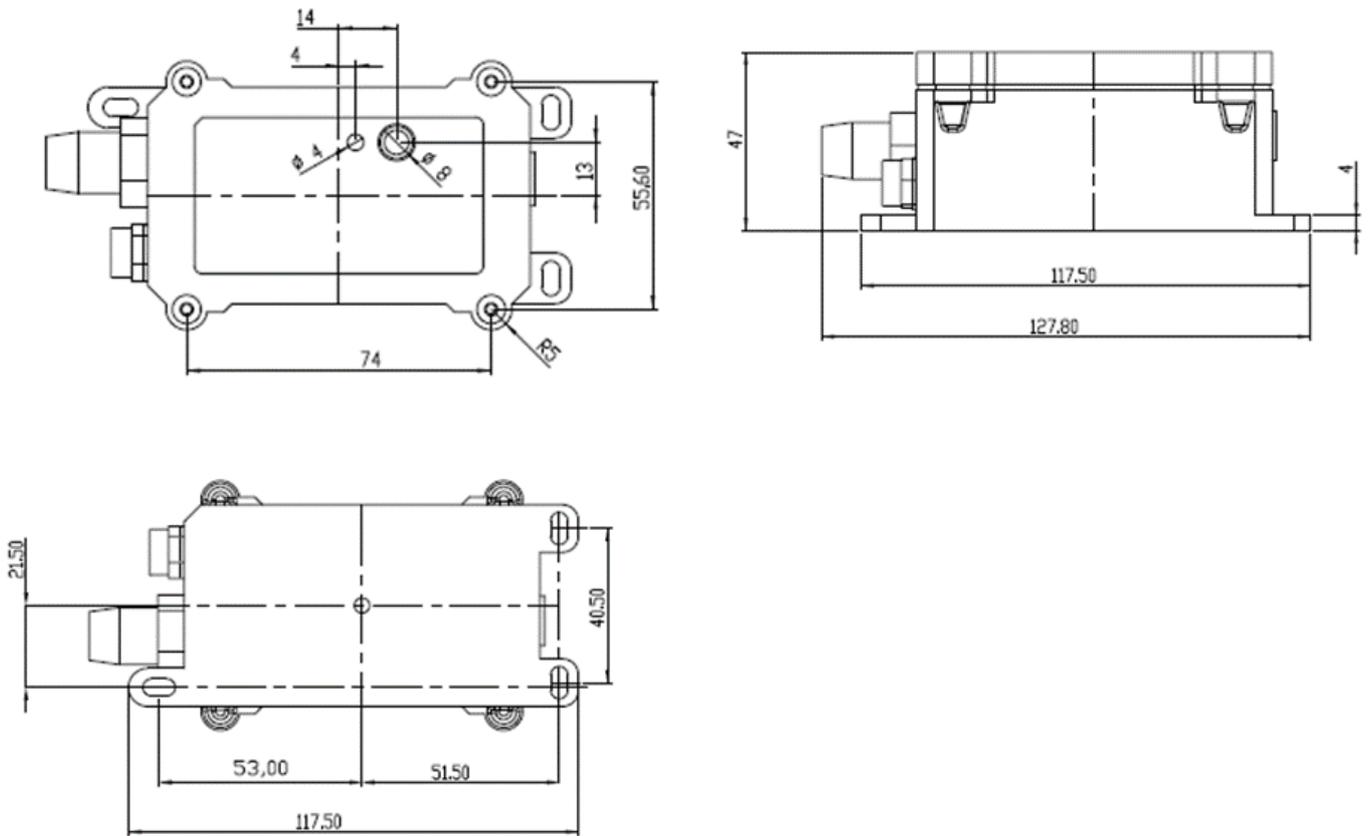
1.11.3 Reset Button

Press to reboot the device.

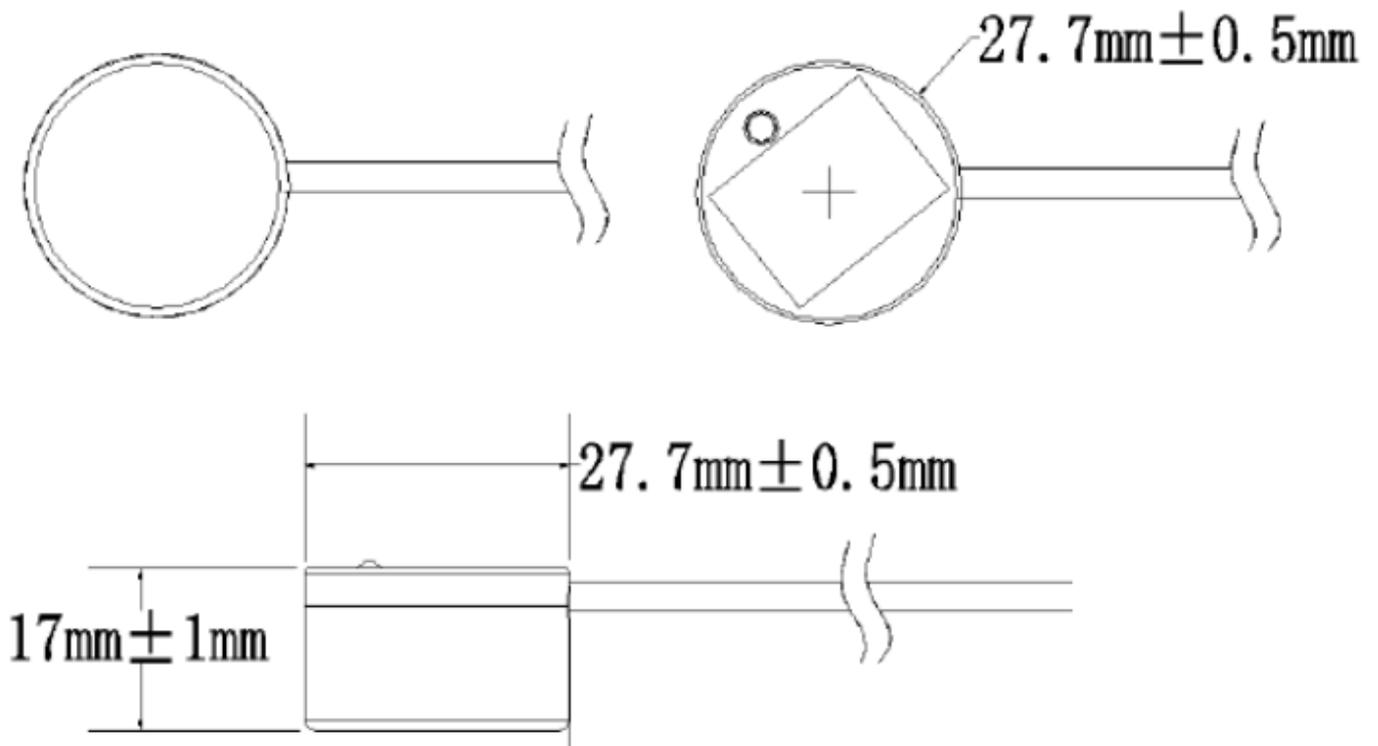
1.11.4 SIM Card Direction

See this link. [How to insert SIM Card](#).

1.12 Mechanical



Probe Mechanical:



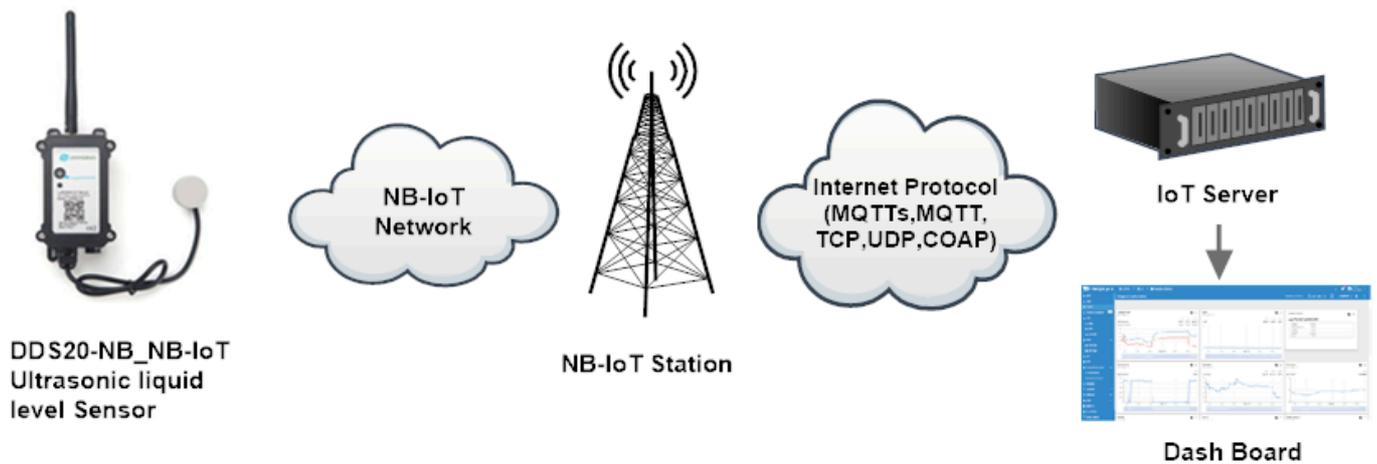
2. Use DDS20-NB to communicate with IoT Server

2.1 Send data to IoT server via NB-IoT network

The DDS20-NB is equipped with a NB-IoT module, the pre-loaded firmware in DDS20-NB 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 DDS20-NB.

Below shows the network structure:

DDS20-NB in a NB-IoT Network



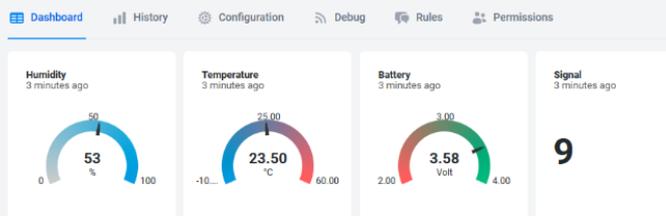
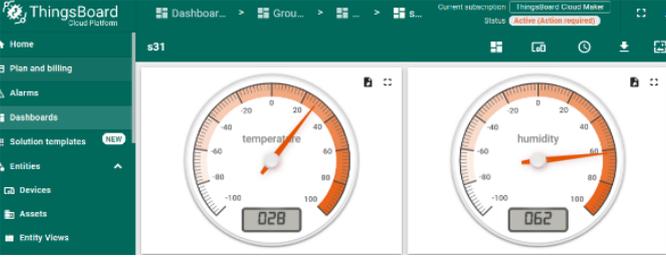
There are two version: **-GE** and **-1T** version of DDS20-NB.

GE Version: This version doesn't include SIM card or point to any IoT server. User needs to use AT Commands to configure below two steps to set DDS20-NB send data to IoT server.

- Install NB-IoT SIM card and configure APN. See instruction of [Attach Network](#).
- Set up sensor to point to IoT Server. See instruction of [Configure to Connect Different Servers](#).

Below shows result of different server as a glance.

Servers	Dash Board	Comments
Node-Red	<p>The screenshot shows a Node-Red dashboard with four line graphs. The top-left graph is titled 'SHT-TEMP' and shows temperature data over time. The top-right graph is titled 'BAT' and shows battery level data. The bottom-left graph is titled 'SHT-HUM' and shows humidity data. The bottom-right graph is titled 'DSTEMP' and shows another temperature data series. Each graph has a title, a legend, and a time axis.</p>	

DataCake		
Tago.IO		
General UDP	Raw Payload. Need Developer to design Dash Board	
General MQTT	Raw Payload. Need Developer to design Dash Board	
ThingSpeak		
ThingsBoard		

1T Version: This version has 1NCE SIM card pre-installed and configure to send value to ThingsEye. User Just need to select the sensor type in ThingsEyeand Activate DDS20-NB and user will be able to see data in ThingsEye. See here for [ThingsEye Config Instruction](#).

2.2 Payload Types

To meet different server requirement, DDS20-NB supports different payload type.

Includes:

- [General JSON format payload.](#) (Type=5)
- [HEX format Payload.](#) (Type=0)
- [ThingSpeak Format.](#) (Type=1)
- [ThingsBoard Format.](#) (Type=3)

User can specify the payload type when choose the connection protocol. Example:

AT+PRO=1,0 // Use COAP Connection & hex Payload

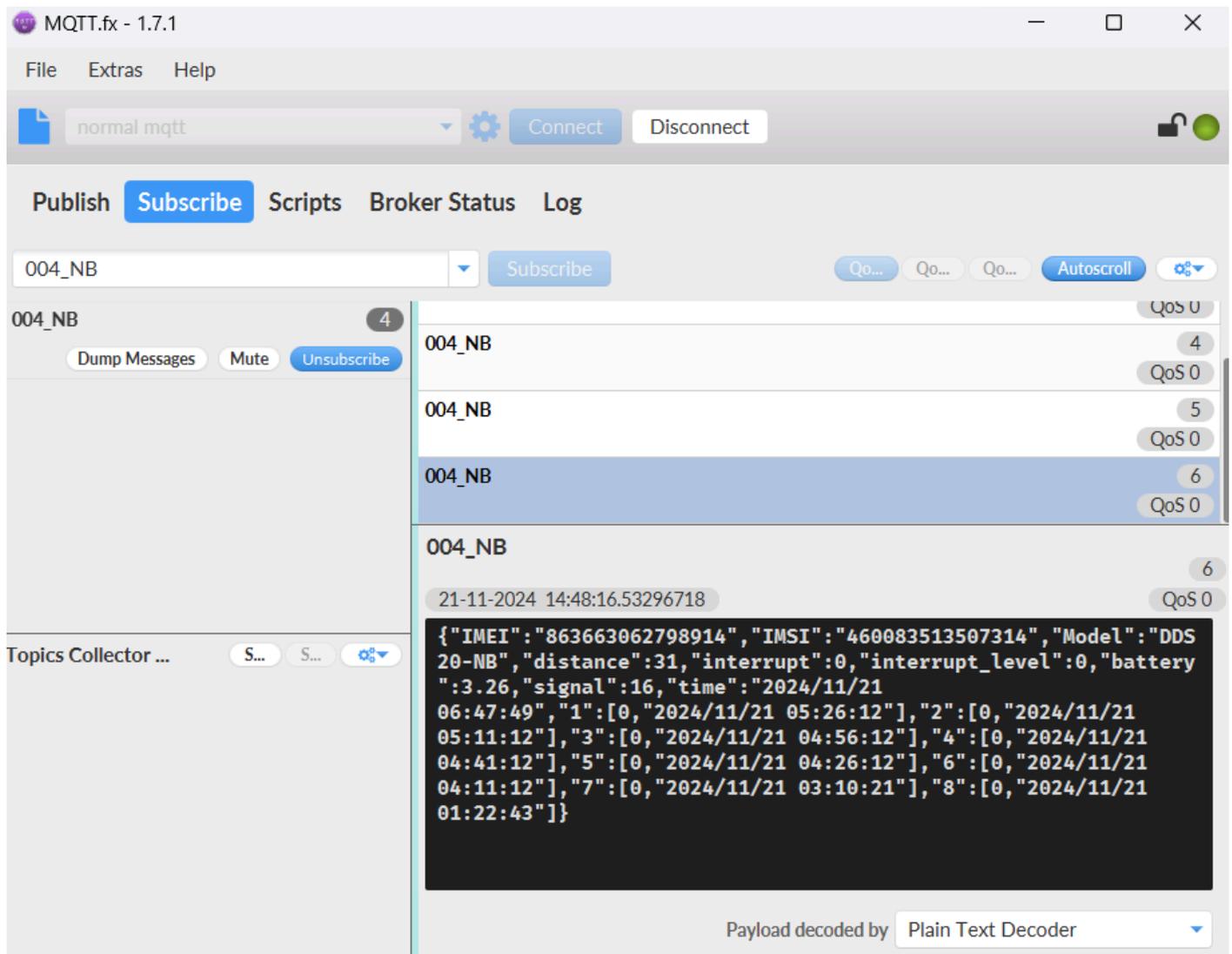
AT+PRO=1,5 // Use COAP Connection & Json Payload

- AT+PRO=2,0** // Use UDP Connection & hex Payload
- AT+PRO=2,5** // Use UDP Connection & Json Payload
- AT+PRO=3,0** // Use MQTT Connection & hex Payload
- AT+PRO=3,5** // Use MQTT Connection & Json Payload
- AT+PRO=4,0** // Use TCP Connection & hex Payload
- AT+PRO=4,5** // Use TCP Connection & Json Payload

2.2.1 General Json Format(Type=5)

This is the General Json Format. As below:

```
{
  "IMEI": "863663062798914",
  "IMSI": "460083513507314",
  "Model": "DDS20-NB",
  "distance": 31,
  "interrupt": 0,
  "interrupt_level": 0,
  "battery": 3.26,
  "signal": 16,
  "time": "2024/11/21 06:47:49",
  "1": [0, "2024/11/21 05:26:12"],
  "2": [0, "2024/11/21 05:11:12"],
  "3": [0, "2024/11/21 04:56:12"],
  "4": [0, "2024/11/21 04:41:12"],
  "5": [0, "2024/11/21 04:26:12"],
  "6": [0, "2024/11/21 04:11:12"],
  "7": [0, "2024/11/21 03:10:21"],
  "8": [0, "2024/11/21 01:22:43"]
}
```



Notice, from above payload:

- Distance, interrupt, interrupt_level, Battery, Signal & time are the value at uplink time.
- Json entry 1 ~ 8 are the last 1 ~ 8 sampling data as specify by **AT+CLOCKLOG=1,65535,15,8** Command. Each entry includes (from left to right): Distance, Sampling time.

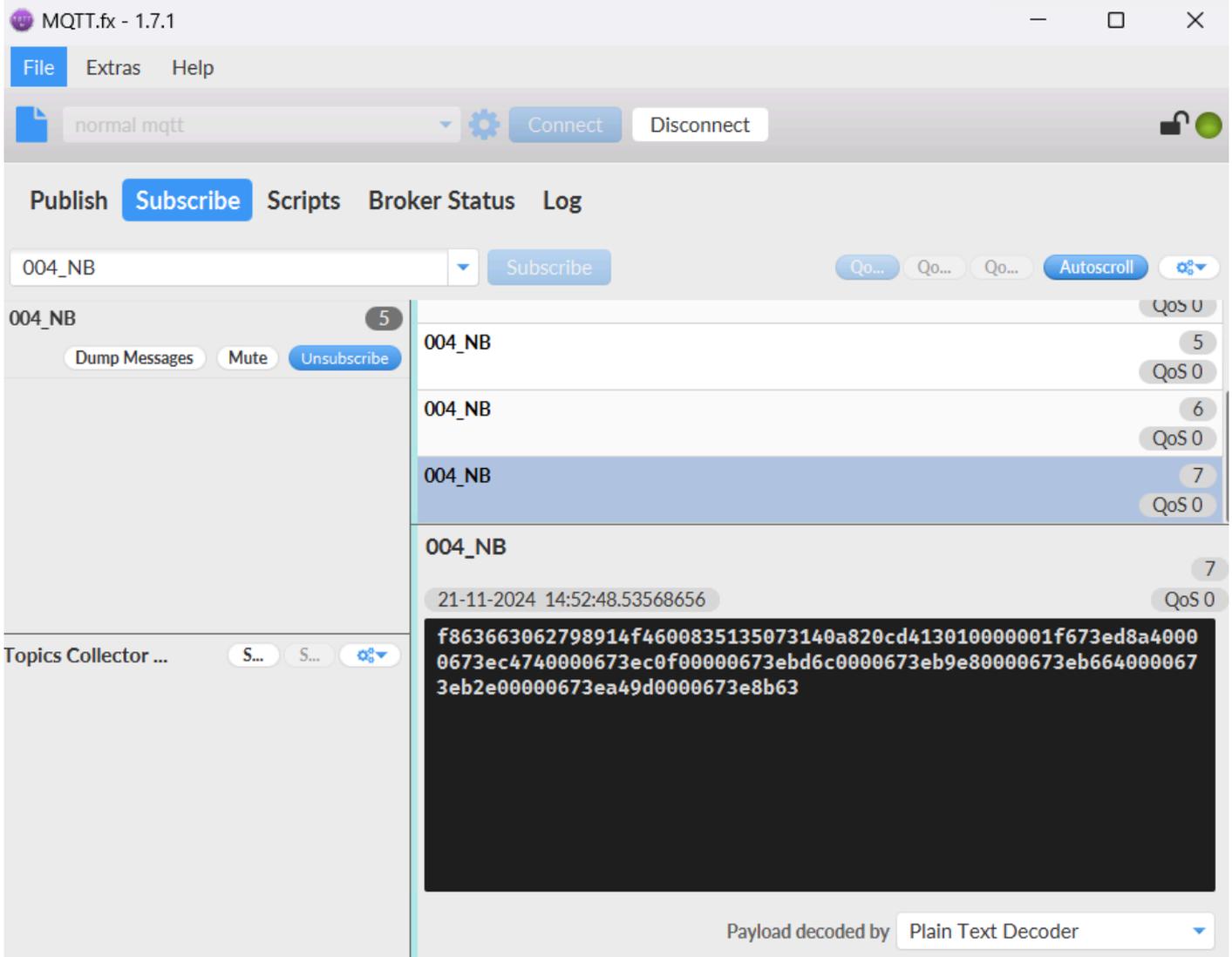
2.2.2 HEX format Payload(Type=0)

This is the HEX Format. As below:

f863663062798914f4600835135073140a820cd41301000001f673ed8a40000673ec4740000673ec0f00000673

HEX Format for DDS20-NB(AT+CLOCKLOG=1,65535,15,8)		0a82	0cd4	13	01	00	00	001f	673ed8a4
f863663062798914	f460083513507314	Version	BAT	signal	Mod	Interrupt	Interrupt_level	Distance	Timestamp
f+IMEI 8 Bytes	f+IMSI 8 Bytes								
0000 Distance 6 Bytes	673ec474 Timestamp 6 Bytes	0000673ec0f0 last 2nd data 6 Bytes	0000673ebd6c last 3rd data 6 Bytes	0000673eb9e8 last 4th data 6 Bytes					
0000673eb664 last 5th data 6 Bytes	0000673eb2e0 last 6th data 6 Bytes	0000673ea49d last 7th data 6 Bytes		0000673e8b63 last 8th data 6 Bytes					

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



Version:

These bytes include the hardware and software version.

Higher byte: Specify Sensor Model: 0x0a for DDS20-NB

Lower byte: Specify the software version: 0x82=130, means firmware version 1.3.0

BAT (Battery Info):

Ex1: 0x0d28 = 3368mV

Signal Strength:

NB-IoT Network signal Strength.

Ex1: 0x12 = 18

0 -113dBm or less

1 -111dBm

2...30 -109dBm... -53dBm

31 -51dBm or greater

99 Not known or not detectable

Distance:

Ex1: 0x002C = 44 mm

TimeStamp:

Unit TimeStamp Example: 66518047(H) = 1716617287(D)

Put the decimal value into this link (<https://www.epochconverter.com>) to get the time.

2.2.3 ThingsBoard Payload(Type=3)

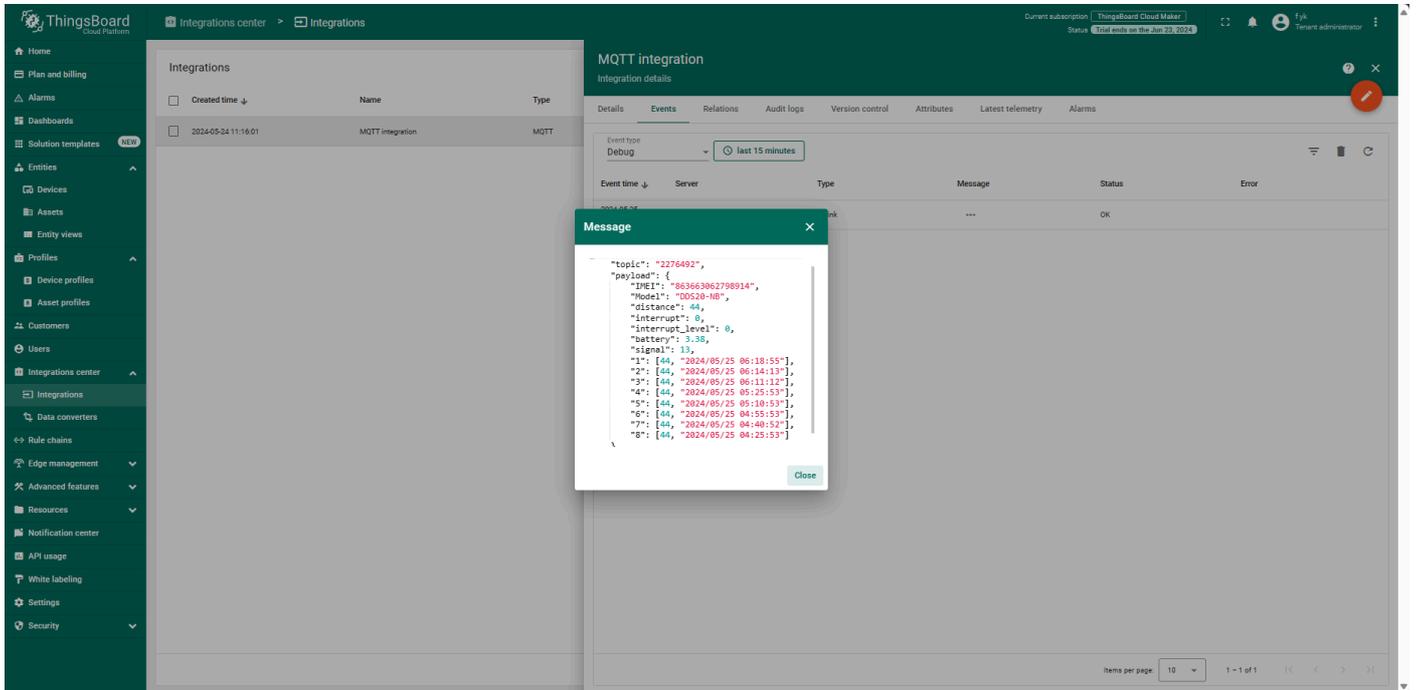
Type3 payload special design for ThingsBoard, it will also configure other default server to ThingsBoard.

```
{
  "topic": "2276492",
  "payload": {
    "IMEI": "863663062798914",
    "Model": "DDS20-NB",
    "distance": 44,
    "interrupt": 0,
    "interrupt_level": 0,
    "battery": 3.38,
    "signal": 13,
    "1": [44, "2024/05/25 06:18:55"],
    "2": [44, "2024/05/25 06:14:13"],
    "3": [44, "2024/05/25 06:11:12"],
    "4": [44, "2024/05/25 05:25:53"],
```

```

"5": [44, "2024/05/25 05:10:53"],
"6": [44, "2024/05/25 04:55:53"],
"7": [44, "2024/05/25 04:40:52"],
"8": [44, "2024/05/25 04:25:53"]

```



2.2.4 ThingSpeak Payload(Type=1)

This payload meets ThingSpeak platform requirement. It includes only four fields. Form 1~3 are:

Distance, Battery & Signal. This payload type only valid for ThingsSpeak Platform

As below:

field1=Distance value&field2=Battery value&field3=Signal value

2.3 Test Uplink and Change Update Interval

By default, Sensor will send uplinks **every 2 hours** & AT+NOUD=8

User can use below commands to change the **uplink interval**.

AT+TDC=7200 // Set Update Interval to 7200s

User can also push the button for more than 1 seconds to activate an uplink.

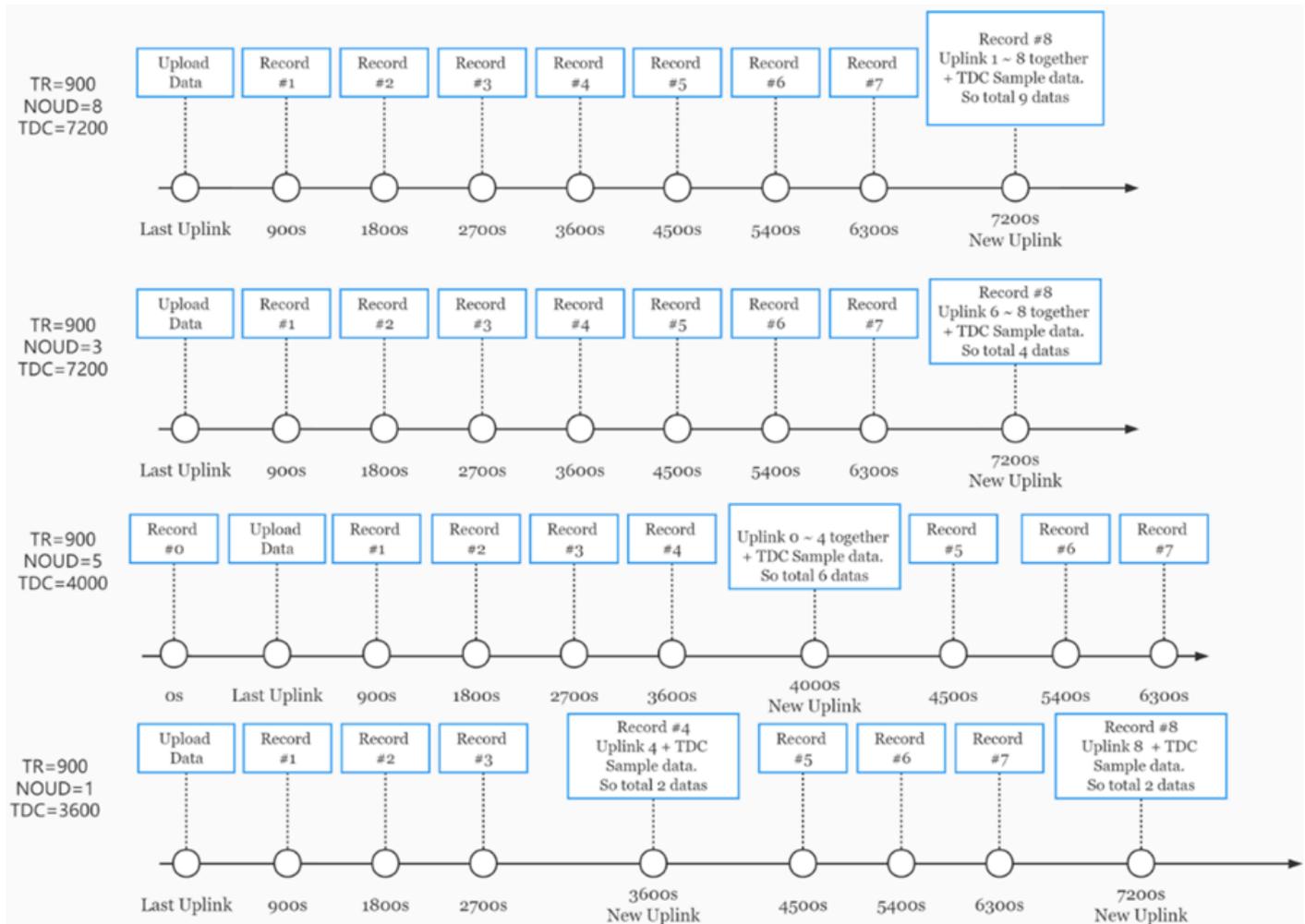
2.4 Multi-Samplings and One uplink

Notice: The AT+NOUD feature is upgraded to Clock Logging, please refer [Clock Logging Feature](#)

To save battery life, DDS20-NB will sample Distance data every 15 minutes and send one uplink every 2 hours. So each uplink it will include 8 stored data + 1 real-time data. They are defined by:

- **AT+TR=900** // The unit is seconds, and the default is to record data once every 900 seconds (15 minutes, 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:



2.5 Trigger an uplink by external interrupt

DDS20-NB has an external trigger interrupt function. Users can use the GPIO_EXTI pin to trigger the upload of data packets.

AT command:

- **AT+INTMOD** // Set the trigger interrupt mode
- **AT+INTMOD=0** // Disable Interrupt
- **AT+INTMOD=1** // Trigger by rising and falling edge
- **AT+INTMOD=2** // Trigger by falling edge

- **AT+INTMOD=3** // Trigger by rising edge

2.6 Clock logging (Since firmware version v1.2.1)

Sometimes when we deploy lots of end nodes in field. We want all sensors sample data at the same time, and upload these data together for analyze. In such case, we can use clock logging feature.

We can use this command to set the start time of data recording and the time interval to meet the requirements of the specific collection time of data.

- **AT command: AT+CLOCKLOG=a,b,c,d**

a: 0: Disable Clock logging. **1:** Enable Clock Logging

b: Specify First sampling start second: range (0 ~ 3599, 65535) // **Note:** If parameter b is set to 65535, the log period starts after the node accesses the network and sends packets.

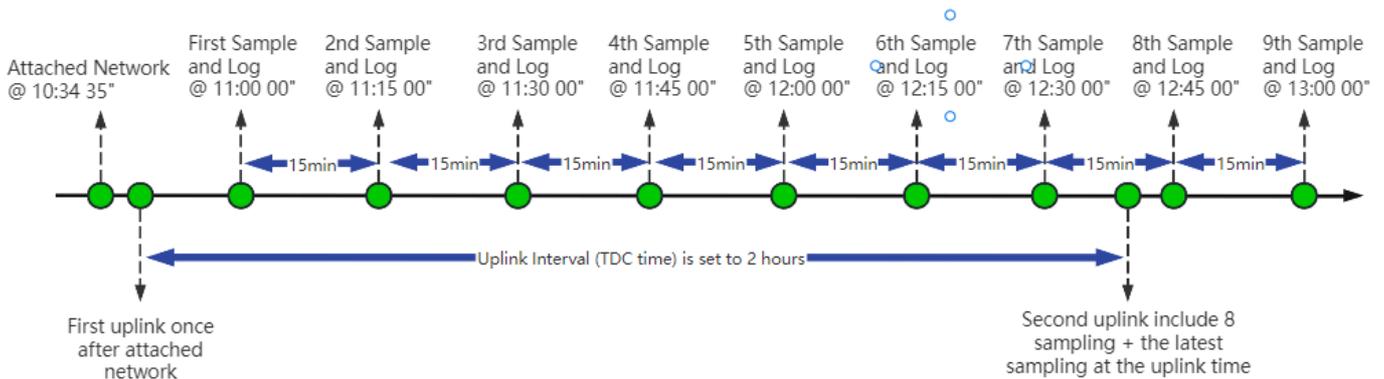
c: Specify the sampling interval: range (0 ~ 255 minutes)

d: How many entries should be uplink on every TDC (max 32)

Note: To disable clock recording, set the following parameters: AT+CLOCKLOG=1,65535,0,0

Example: AT+CLOCKLOG=1,0,15,8

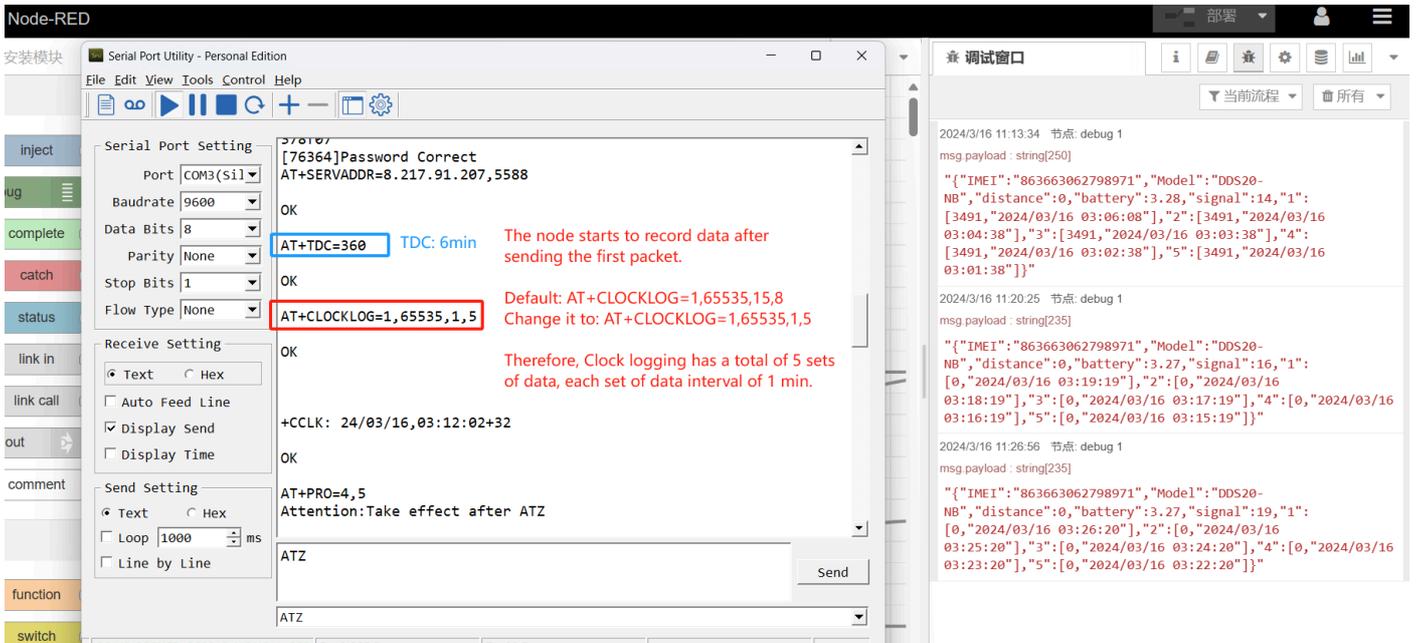
Device will log data to memory start from the 0th second (11:00 00" of first hour and then sampling and log every 15 minutes. Every TDC uplink, the uplink payload will consist: Battery info + last 8 memory record with timestamp + the latest sample at uplink time) . See below for the example.



Example:

AT+CLOCKLOG=1,65535,1,5

After the node sends the first packet, data is recorded to the memory at intervals of 1 minute. For each TDC uplink, the uplink load will include: battery information + the last 5 memory records (payload + timestamp).



Note: Users need to synchronize the server time before configuring this command. If the server time is not synchronized before this command is configured, the command takes effect only after the node is reset.

- **Downlink command: 0x0A**

Format: Command Code (0x0A) followed by 5 bytes.

- **Example 1:** Downlink Payload: **0A01FFFF0F08** // Set SHT record time:
AT+CLOCKLOG=1,65535,15,8
- **Example 1:** Downlink Payload: **0A0104B00F08** // Set SHT record time:
AT+CLOCKLOG=1,1200,15,8

Note: When entering the downlink payload, there must be no Spaces between bytes.

2.7 Datalog Function(Since firmware version v1.3.4)

2.7.1 Unix TimeStamp

DDS20-NB uses Unix TimeStamp format based on

Size (bytes)	4	1
DeviceTimeAns Payload	32-bit unsigned integer : Seconds since epoch*	8bits unsigned integer: fractional-second in 1/2^8 second steps

Figure 10 : DeviceTimeAns payload format

User can get this time from link: <https://www.epochconverter.com/> :

Below is the converter example

The current Unix epoch time is **1725875974**

Convert epoch to human-readable date and vice versa

[batch convert]

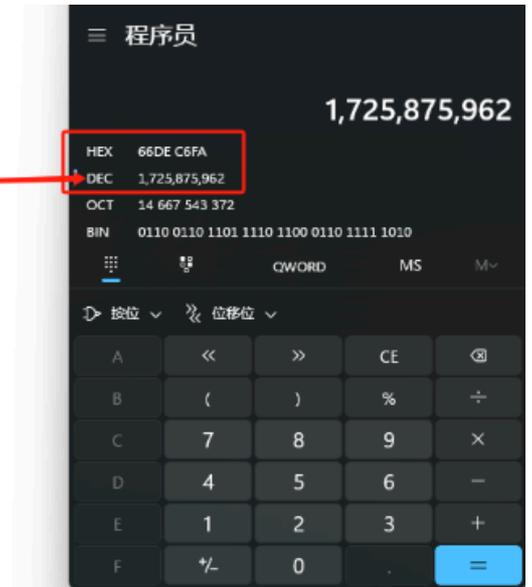
Supports Unix timestamps in seconds, milliseconds, microseconds and nanoseconds.

Assuming that this timestamp is in **seconds**:

GMT : Monday, September 9, 2024 9:59:22 AM
Your time zone : Monday, September 9, 2024 5:59:22 PM GMT+08:00
Relative : A few seconds ago

Yr Mon Day Hr Min Sec GMT

2024 - 9 - 9 9 : 59 : 22 GMT



So, 1725875962 means that the current time is Monday, September 9, 2024 at 9:59 AM.

2.7.2 Poll sensor value

User can poll sensor value based on timestamps from the server. Below is the downlink command.

1 byte	4 bytes	4 bytes
31	Timestamp start	Timestamp end

Timestamp start and Timestamp end use Unix TimeStamp format as mentioned above. Devices will reply with all data log during this time period.

For example, downlink command **31 68A0 1C08 68A0 2004**

Is to check 2025/8/16 05:50:00 to 2025/8/16 06:07:00's data

2.7.3 Datalog Uplink payload

The Datalog poll reply uplink will use below payload format.

Retrieval data payload:

Size(bytes)	2	2	4
value	Distance	Reserve	Timestamp

Function Description: This feature is only used when the clock logging feature is turned on. one uplink packet can send **64** groups of stored data totaling **512** bytes.

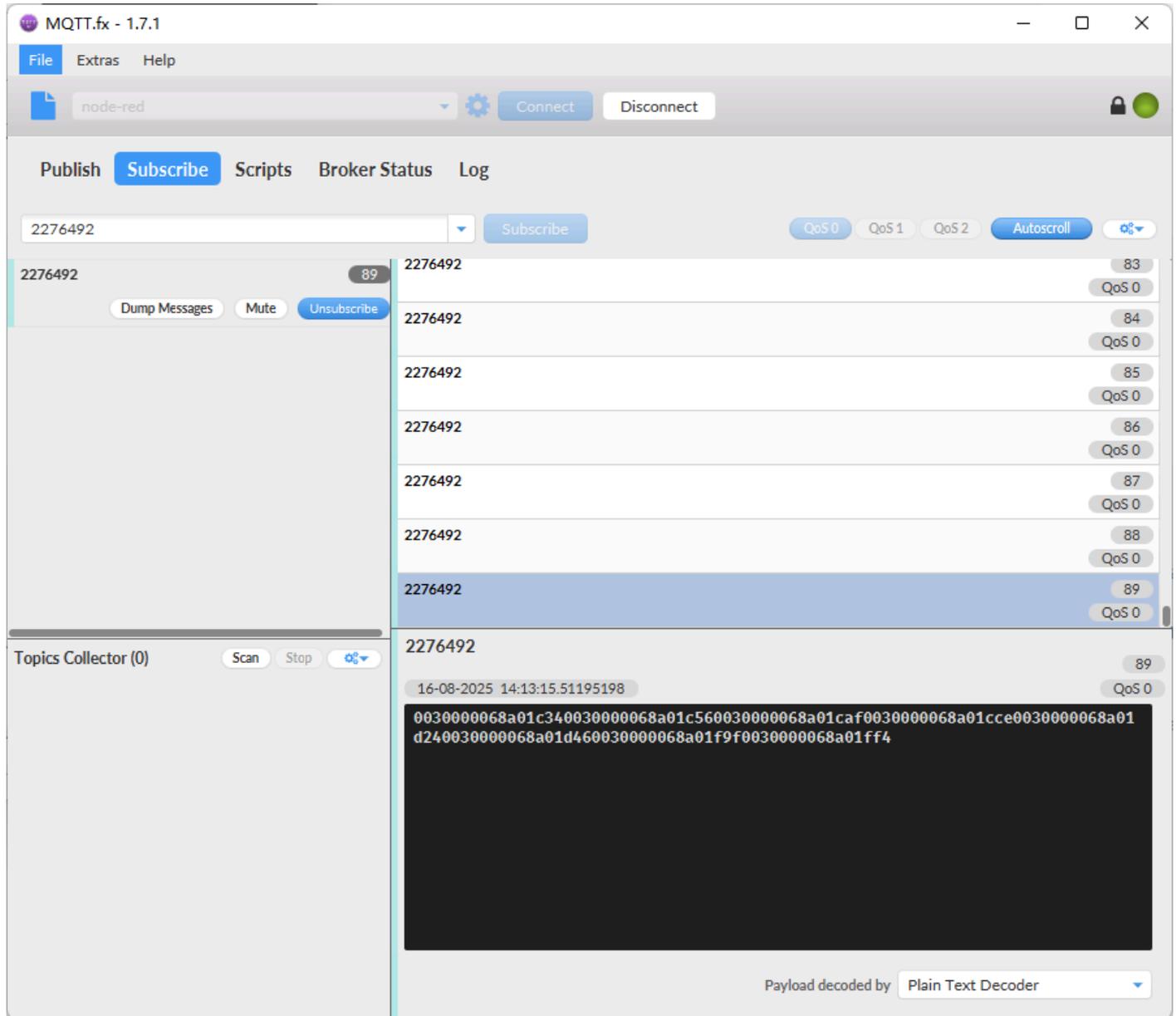
Example(For MQTT.fx):

If user sends below downlink command:

Where : Start time: 68A01C08 = time 25/8/16 05:50:00

Stop time: 68A02004 = time 25/8/16 06:07:00

DDS20-NB will uplink this payload.



0x0030000068a01c340030000068a01c560030000068a01caf0030000068a01cce0030000068a01d24003000006

DDS20-NB(8 groups for example)			
0030 0000 68a01c34	0030000068a01c56	0030000068a01caf	0030000068a01cce
Distance Reserve Timestamp	2nd data	3rd data	4th data
8 Bytes	8 Bytes	8 Bytes	8 Bytes
0030000068a01d24	0030000068a01d46	0030000068a01f9f	0030000068a01ff4
5th data	6th data	7th data	8th data
8 Bytes	8 Bytes	8 Bytes	8 Bytes

Distance= 0x0030=48mm

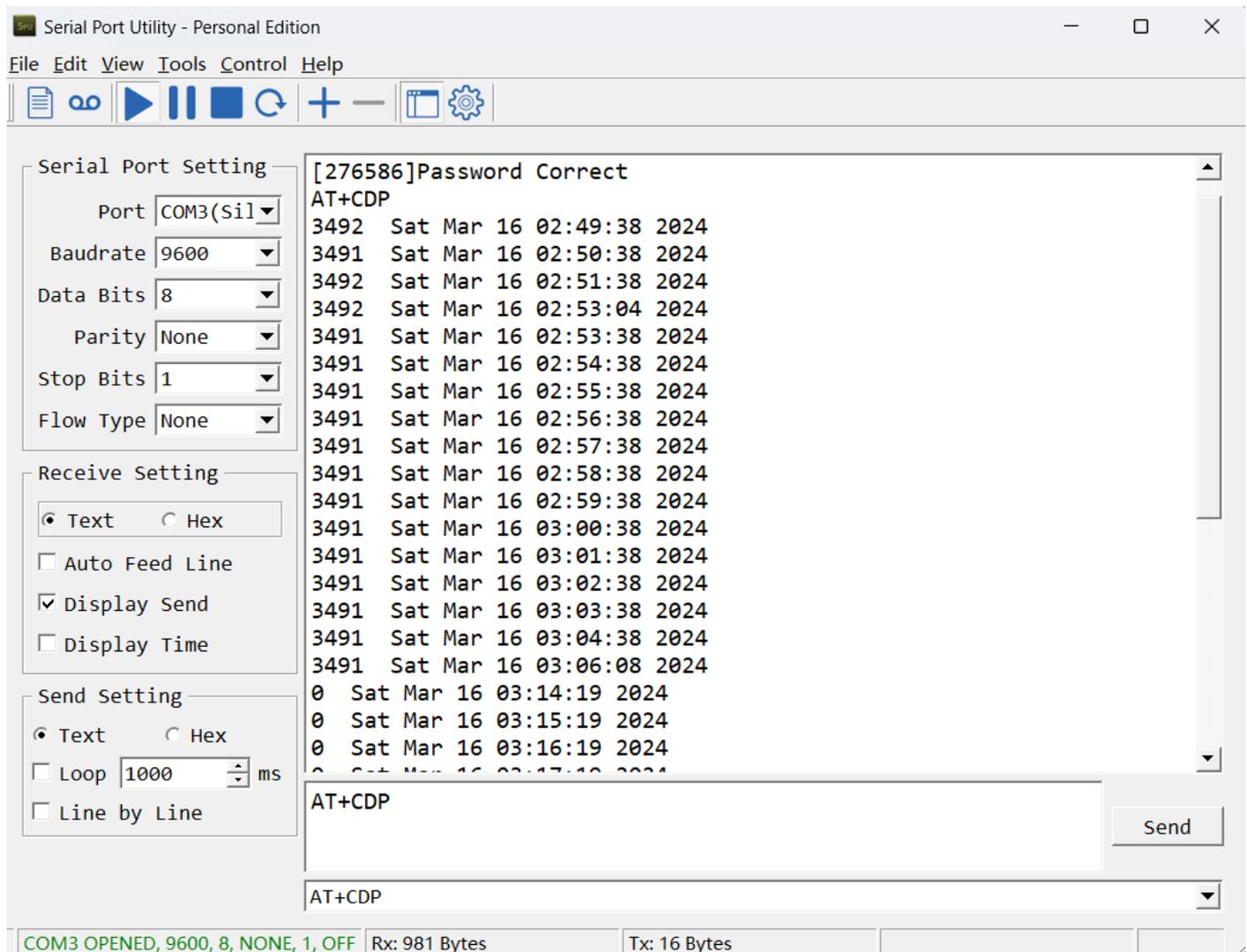
Reserve =0x0000

Unix time is 0x68a01c34 =1755323444s=25/8/16 05:50:00

2.8 Example Query saved historical records

- **AT command: AT+CDP**

This command can be used to search the saved history, recording up to 32 groups of data, each group of historical data contains a maximum of 100 bytes.



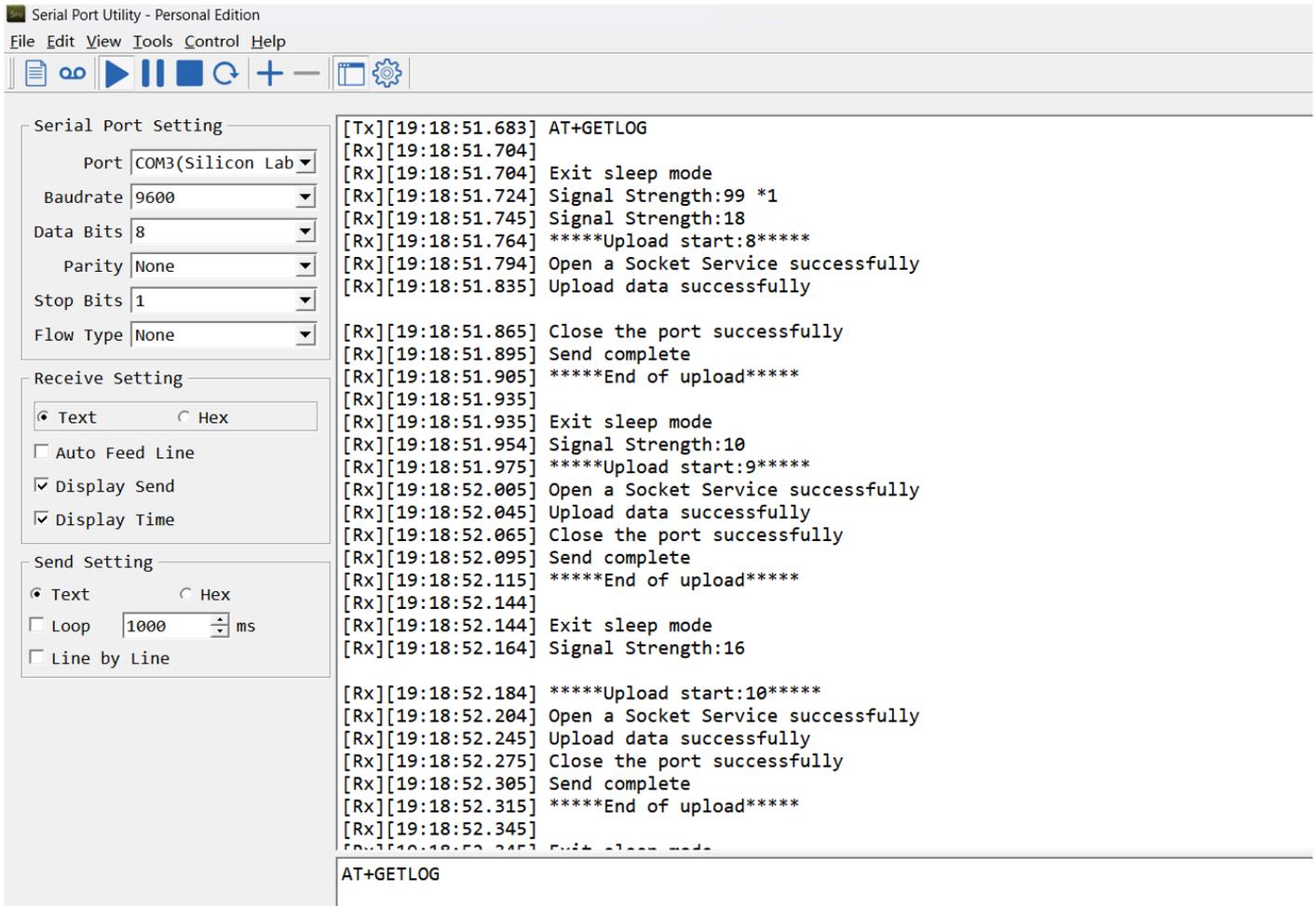
The screenshot shows the Serial Port Utility - Personal Edition window. The Serial Port Setting panel is on the left, showing Port COM3(Sil), Baudrate 9600, Data Bits 8, Parity None, Stop Bits 1, and Flow Type None. The Receive Setting panel has Text selected, and the Send Setting panel has Text selected. The main window displays the output of the AT+CDP command, showing a list of historical records with timestamps and data. The status bar at the bottom indicates COM3 OPENED, 9600, 8, NONE, 1, OFF, Rx: 981 Bytes, and Tx: 16 Bytes.

```
[276586]Password Correct
AT+CDP
3492 Sat Mar 16 02:49:38 2024
3491 Sat Mar 16 02:50:38 2024
3492 Sat Mar 16 02:51:38 2024
3492 Sat Mar 16 02:53:04 2024
3491 Sat Mar 16 02:53:38 2024
3491 Sat Mar 16 02:54:38 2024
3491 Sat Mar 16 02:55:38 2024
3491 Sat Mar 16 02:56:38 2024
3491 Sat Mar 16 02:57:38 2024
3491 Sat Mar 16 02:58:38 2024
3491 Sat Mar 16 02:59:38 2024
3491 Sat Mar 16 03:00:38 2024
3491 Sat Mar 16 03:01:38 2024
3491 Sat Mar 16 03:02:38 2024
3491 Sat Mar 16 03:03:38 2024
3491 Sat Mar 16 03:04:38 2024
3491 Sat Mar 16 03:06:08 2024
0 Sat Mar 16 03:14:19 2024
0 Sat Mar 16 03:15:19 2024
0 Sat Mar 16 03:16:19 2024
0 Sat Mar 16 03:17:19 2024
AT+CDP
```

2.9 Uplink log query

- **AT command: AT+GETLOG**

This command can be used to query upstream logs of data packets.



2.10 Scheduled domain name resolution

This command is used to set up scheduled domain name resolution.

AT command:

- **AT+DNSTIMER=XX** // Unit: hour

After setting this command, domain name resolution will be performed regularly.

2.11 Set the QoS level

This command is used to set the QoS level of **MQTT**.

AT command:

- **AT+MQOS=xx** // 0~2

Downlink command: 0x07

Format: Command Code (0x07) followed by 1 byte.

Ex1: Downlink payload: **0x0700** // AT+MQOS=0

Ex2: Downlink payload: **0x0701** // AT+MQOS=1

2.12 Distance Alarm

Feature: Set alarm of LDDS and NMDS.

AT command: AT+LDDALARM (Range: 20mm - 2000mm)

Example: AT+LDDALARM=500,1000 // Set the alarm threshold

Downlink Command: 0x08

Format: Command Code (0x08) followed by 4 bytes.

Example: Downlink Payload: **08 01 F4 03 E8** // AT+LDDALARM=500,1000

2.13 Set the downlink debugging mode(Since firmware v1.3.0)

Feature: Enable or disable downlink debugging mode. (Since TE platform update, the platform version selection is no longer needed; only downlink debugging can be toggled.)

AT command: AT+DOWNTE

Command Example	Function/Parameters	Response/Explanation
AT+DOWNTE=?	Get current Settings	0,0 (default) OK
AT+DOWNTE=0,a	a: Enable/Disable downlink debugging	0: Disable downlink debugging mode. 1: Enable downlink debugging mode (users can view original downlink messages).

(Note: The first parameter is fixed to 0 and only the second parameter is configurable.)

Example:

- AT+DOWNTE=0,1 → Enable downlink debugging mode.
- AT+DOWNTE=0,0 → Disable downlink debugging mode.

Downlink Command:

No downlink commands for feature

2.14 Domain name resolution settings(Since firmware v1.3.0)

Feature: Set dynamic domain name resolution IP.

AT command: AT+BKDNS

Command Example	Function/Parameters	Response/Explanation
AT+BKDNS=?	Get current Settings	0,0,NULL (default) OK
AT+BKDNS=a,b,c	a: Enable/Disable dynamic domain name resolution.	1: Disable dynamic domain name update. The ip address will be saved after the domain name is resolved, if the next domain name resolution fails, the last saved ip address will be used. 2: Enable dynamic domain name update. The ip address will be saved after domain name resolution, if the next domain name resolution fails, the last saved ip address will be used, and the domain name resolution will be updated regularly according to the time set by the customer.
	b: Set the time to update the domain name resolution at regular intervals.	Unit: hour
	c: Set the IP address manually.	The format is the same as AT+SERVADDR. If domain name resolution fails, this ip address will be used directly, if domain name resolution succeeds, parameter c will be updated to the successfully resolved IP address.

Example:

- AT+BKDNS=1,0 // Dynamic domain name resolution is disabled.
- AT+BKDNS=2,1 // The dynamic domain name resolution function is enabled and the automatic update time is set to 1 hour.
- AT+BKDNS=2,4,3.69.98.183,1883 // The dynamic domain name resolution function is enabled and the automatic update time is set to 4 hour, and manually set the ip address, if the domain name failed to resolve, it will directly use this ip to communicate. When the next domain name resolution is successful, it will be updated to the ip address of the successful resolution.

Downlink Command:

No downlink commands for feature

2.15 Set CoAP option

This command sets the connection parameters of the COAP.

AT command:

- AT+URI1 // CoAP option name, CoAP option length, "CoAP option value"
- AT+URI2 // CoAP option name, CoAP option length, "CoAP option value"
- AT+URI3 // CoAP option name, CoAP option length, "CoAP option value"
- AT+URI4 // CoAP option name, CoAP option length, "CoAP option value"

Example:

- AT+URI1=11,38,"/faaa241f-af4a-b780-4468-c671bb574858"

2.16 Print last few data entries(Since firmware v1.3.4)

Feature: Print the last few data entries

AT command: AT+PLDTA

Command Example	Response
AT+PLDTA=5 Print last 5 entries	Stop Tx events when read sensor data 1 25/8/16 03:50:17 distance=48 2 25/8/16 03:52:17 distance=48 3 25/8/16 03:54:10 distance=48 4 25/8/16 03:54:18 distance=48 5 25/8/16 03:56:17 distance=48 Start Tx events OK

Downlink Command:

No downlink commands for feature

2.17 Print data entries base on page(Since firmware v1.3.4)

Feature: Print the sector data from start page to stop page.

AT command: AT+PDTA

Command Example	Response
-----------------	----------

AT+PDTA=1,1 Print page 1 to 1	Stop Tx events when read sensor data 8028A00 25/8/2 07:08:33 distance=270 8028A08 -30/1/1 00:04:29 distance=0 8028A10 25/8/2 07:09:33 distance=270 8028A18 -30/1/1 00:04:29 distance=0 8028A20 25/8/2 07:10:33 distance=270 8028A28 -30/1/1 00:04:29 distance=0 8028A30 25/8/2 07:11:33 distance=270 8028A38 -30/1/1 00:04:30 distance=0 8028A40 25/8/2 07:12:33 distance=270 8028A48 -30/1/1 00:04:30 distance=0 8028A50 25/8/2 07:13:33 distance=271 8028A58 -30/1/1 00:04:30 distance=0 8028A60 25/8/2 07:14:33 distance=271 8028A68 -30/1/1 00:04:30 distance=0 8028A70 25/8/2 07:15:33 distance=271 8028A78 -30/1/1 00:04:30 distance=0 Start Tx events OK
----------------------------------	---

Downlink Command:

No downlink commands for feature

2.18 Clear Flash Record(Since firmware v1.3.4)

Feature: Clear flash storage for data log feature.

AT command: AT+CLRDTA

Command Example	Function	Response
-----------------	----------	----------

AT+CLRDTA	Clear date record	Stop Tx events,Please wait for the erase to complete Clear all stored sensor data... Start Tx events OK
-----------	-------------------	--

Downlink Command: 0x32

- Example: 0x32 00 // Same as AT+CLRDTA

3. Configure DDS20-NB

3.1 Configure Methods

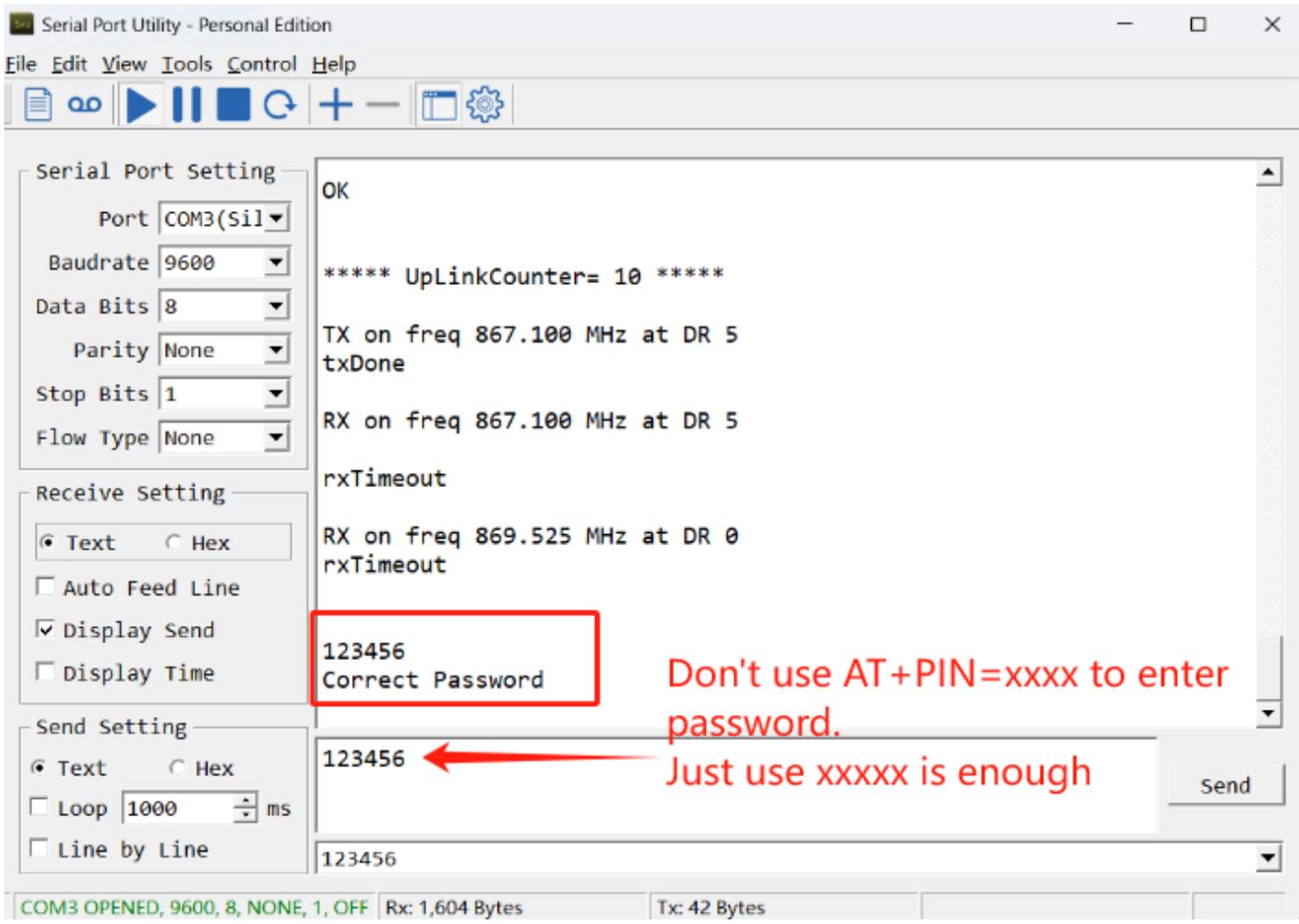
DDS20-NB supports below configure method:

- AT Command via Bluetooth Connection (**Recommended**): [BLE Configure Instruction](#) .
- AT Command via UART Connection : See [UART Connection](#) .

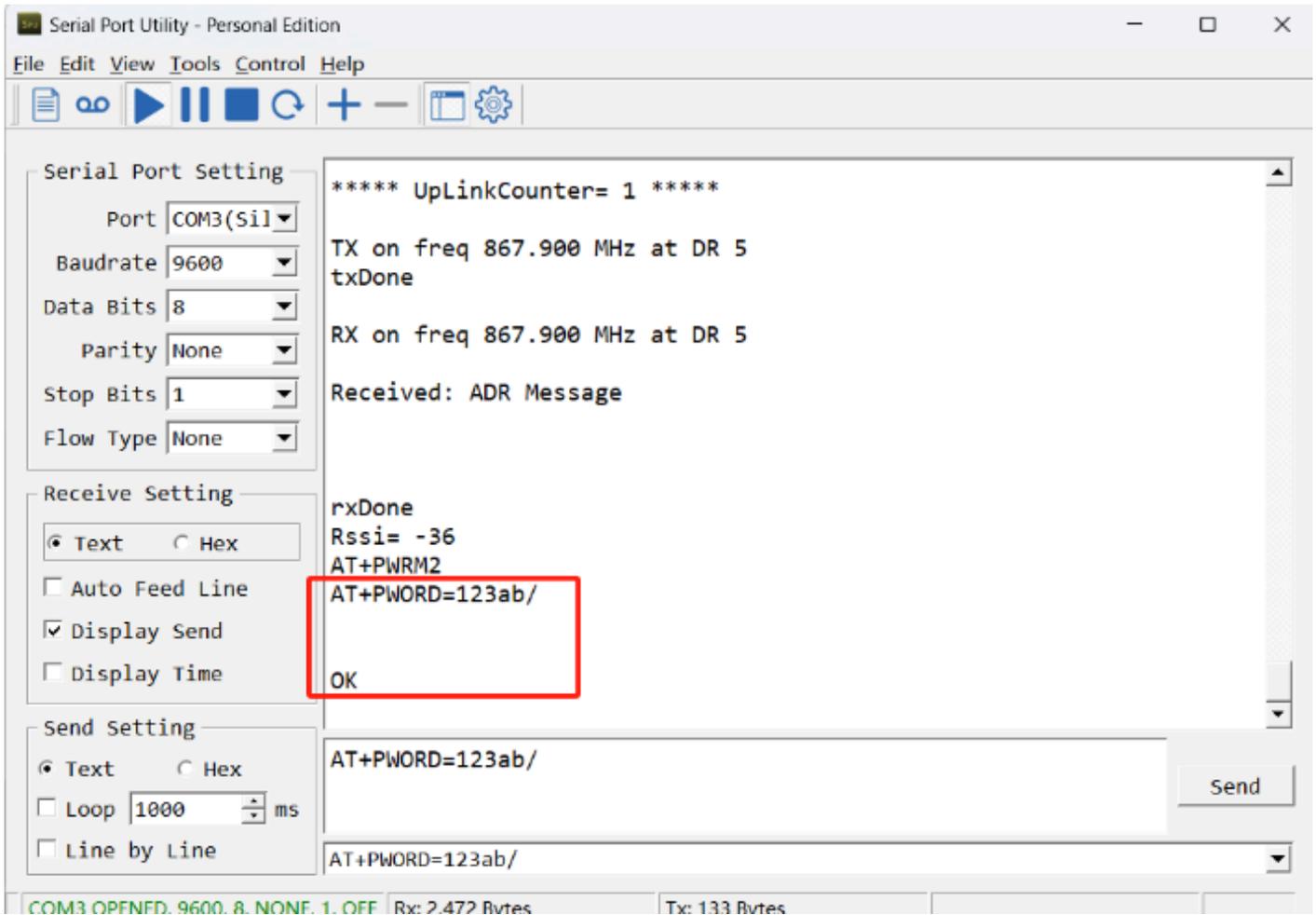
3.2 Serial Access Password

After the Bluetooth or UART connection is successful, use the Serial Access Password to enter the AT command window.

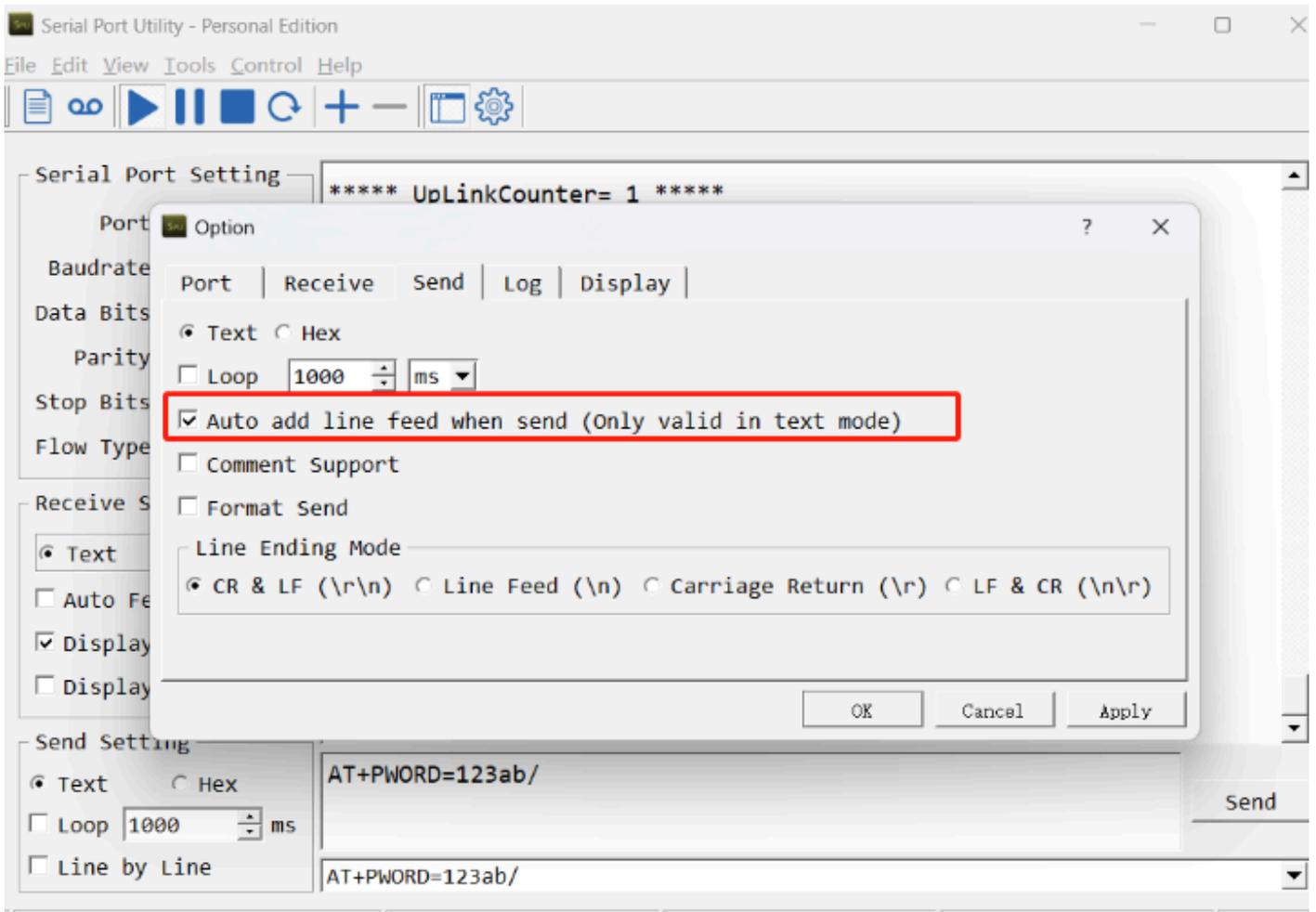
The label on the box of the node will print the initial password: AT+PIN=xxxxxx, and directly use the six-digit password to access the AT instruction window.



If you need to change the password, use **AT+PASSWORD=xxxxxx** (6 characters), NB nodes only support lowercase letters.



Note: After entering the command, you need to add a line break, and you can also set automatic line breaks in the Bluetooth tool or UART connection tool.



3.3 AT Commands Set

AT+<CMD>? : Help on <CMD>

AT+<CMD> : Run <CMD>

AT+<CMD>=<value> : Set the value

AT+<CMD>=? : Get 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+DEUI : Get or set the Device ID

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+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+SHTEMP: Get or Set alarm of temp
AT+SHHUM: Get or Set alarm of moisture
AT+SERVADDR : Server Address

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+PASSWORD : Serial Access Password
AT+LDATA : Get the last upload data
AT+CDP : Read or Clear cached data

4. Battery & Power Consumption

DDS20-NB use ER26500 + SPC1520 battery pack. See below link for detail information about the battery info and how to replace.

[Battery Info & Power Consumption Analyze](#)  .

5. Firmware update

User can change device firmware to:

- Update with new features.

- Fix bugs.

Firmware and changelog can be downloaded from : [Firmware download link](#)

Methods to Update Firmware:

- (Recommended way) OTA firmware update via BLE: [Instruction](#).
- Update through UART TTL interface : [Instruction](#).

6. FAQ

6.1 How can I access t BC660K-GL AT Commands?

User can access to BC660K-GL directly and send AT Commands.

[See BC660K-GL AT Command set](#)

6.2 How to configure the certificate?

User can refer to this [description](#) to configure the certificate.

6.3 Why i always see 0x0000 or 0 for the distance value?

DDS20-NB has a strict [installation requirement](#). Please make sure the installation method exactly follows up with the installation requirement. Otherwise, the reading might be always 0x00.

If you have followed the instruction requirement exactly but still see the 0x00 reading issue, please. please double-check the decoder, you can check the raw payload to verify.

6.4 Why is there no LED response when I press the button on the solar panel model?

If the LED does not light up when you press the button, it may be because the battery has entered protection mode.

Solution: To reactivate the battery, simply expose the solar panel to direct sunlight.

For more details, please refer to: [Battery Protection State \(Apply to Solar Panel + Li-ion battery\)](#)

7. Order Info

Part Number: **DDS20-NB-XX**

XX:

- **GE:** General version (Exclude SIM card)
- **1T:** with 1NCE * 10 years 500MB SIM card and Pre-configure to ThingsEye server

8. Packing Info

Package Includes:

- DDS20-NB NB-IoT Ultrasonic liquid level sensor x 1
- External antenna x 1

Dimension and weight:

- Device Size: 13.0 x 5 x 4.5 cm
- Device Weight: 150g
- Package Size / pcs : 14.0 x 8x 5 cm
- Weight / pcs : 180g

9. Support

- Support is provided Monday to Friday, from 09:00 to 18:00 GMT+8. Due to different timezones 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.cc.