MDS120-NB -- NB-IoT Microwave Radar Distance Sensor User Manual

Last modified by Mengting Qiu (/xwiki/bin/view/XWiki/ting) on 2024/08/05 15:08

Table of Contents:

1. Introduction

1.1 What is MDS120-NB NB-IoT Microwave Radar distance Sensor

The Dragino MDS120-NB is a **NB-IoT Microwave Radar distance Sensor** for Internet of Things solution. It uses use Microwave Radar to **detect the distance be sensor and different objects**. Different from ultrosonic or Lidar measurement. Microwave Radar is **more reliable for condensation / dusty environment**. It ca correct distance even there is water or think dust on top of the sensor.

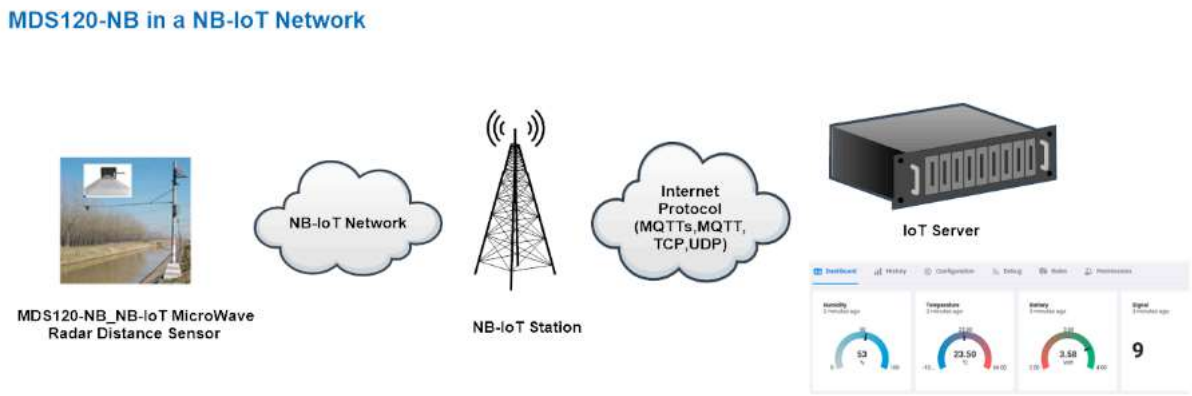
The MDS120-NB can be applied to scenarios such as horizontal distance measurement, parking management system, object proximity and presence detection, in trash can management system, robot obstacle avoidance, automatic control, sewer, etc.

MDS120-NB supports different uplink methods including **MQTT, MQTTs, UDP & TCP** for different application requirement, and support uplinks to various IoT Ser

MDS120-NB **supports BLE configure** and **OTA update** which make user easy to use.

MDS120-NB is powered by **8500mAh Li-SOCI2 battery**, it is designed for long-term use up to several years.

MDS120-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
- 60Ghz Microwave Radar for distance detection
- Measure Range: 15 ~ 1200cm
- Accuracy: ±(2cm+SX0.3%). S: Measure Value
- Resolution: 1cm
- Measurement Angle: 25 degrees horizontal and 23 degrees vertical
- Multiply Sampling and one uplink
- Support Bluetooth v5.1 remote configure and update firmware
- Uplink on periodically
- Downlink to change configure
- 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

Radar probe Spec:

- Measuring Method: FMCW
- Frequency: 60 GHz
- Measure Range : 15 ~ 1200cm
- Accuracy: ±(2cm+SX0.3%). S: Measure Value
- Resolution: 1cm
- Measurement Angle : 25 degrees horizontal and 23 degrees vertical

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 Applications

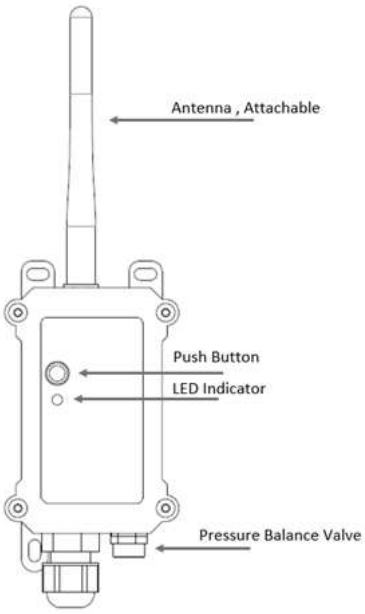
- Horizontal distance measurement
- Liquid level measurement
- Parking management system
- Object proximity and presence detection
- Intelligent trash can management system
- Robot obstacle avoidance
- Automatic control
- Sewer
- Bottom water level monitoring

1.5 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 periodi sensor will be in IDLE mode), in IDLE mode, sensor has the same power consumption as Deep Sleep mode.

1.6 Button & LEDs



Behavior on ACT	Function	Action
Pressing ACT between 1s < time < 3s	Send an uplink	If sensor has already attached to NB-IoT network, sensor will send an uplink packet, **blue led** will blink once. Meanwhile, BLE module will be active and user can connect via BLE to configure device.
Pressing ACT for more than 3s	Active Device	**Green led** will fast blink 5 times, device will enter **OTA mode** for 3 seconds. And then start to attach NB-IoT network. **Green led** will solidly turn on for 5 seconds after joined in network. 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.
Fast press ACT 5 times.	Deactivate Device	**Red led** will solid on for 5 seconds. Means device is in Deep Sleep Mode.

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 prog execution.

1.7 BLE connection

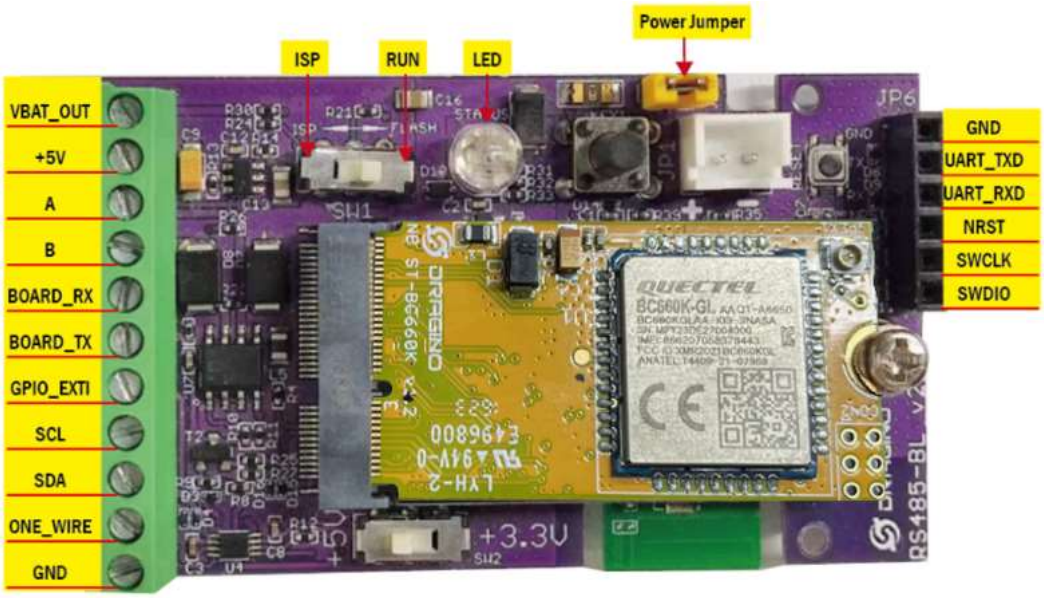
MDS120-NB support BLE remote configure and firmware update.

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.

1.8 Pin Definitions , Switch & SIM Direction



1.8.1 Jumper JP2

Power on Device when put this jumper.

1.8.2 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

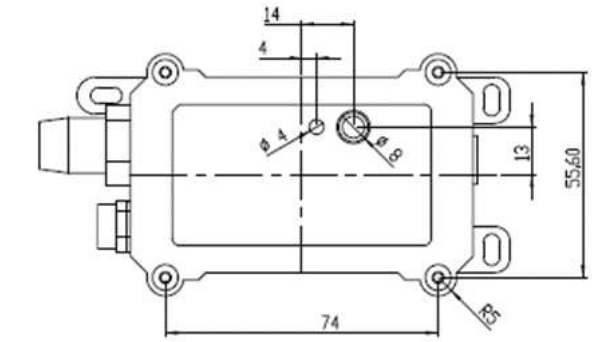
1.8.3 Reset Button

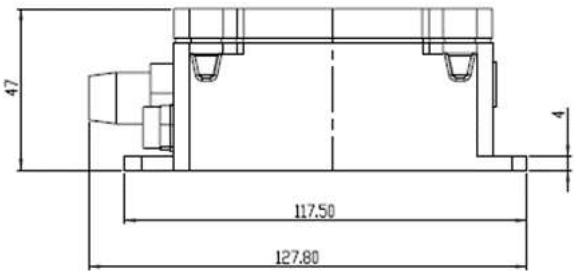
Press to reboot the device.

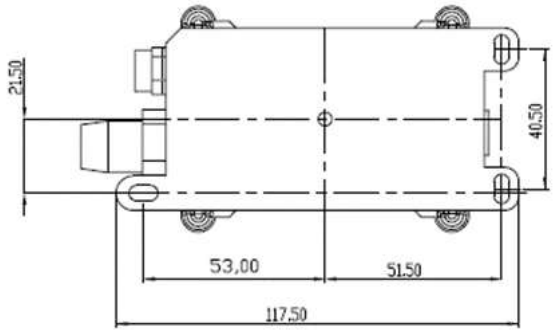
1.8.4 SIM Card Direction

See this link. How to insert SIM Card (http://wiki.dragino.com/xwiki/bin/view/Main/General%20Configure%20to%20Connect%20to%20IoT%20server%20for%20-NB%20%26%20-NS%20NB-IoT%20models/#H2.AttachNetwork) .

1.9 Mechanical





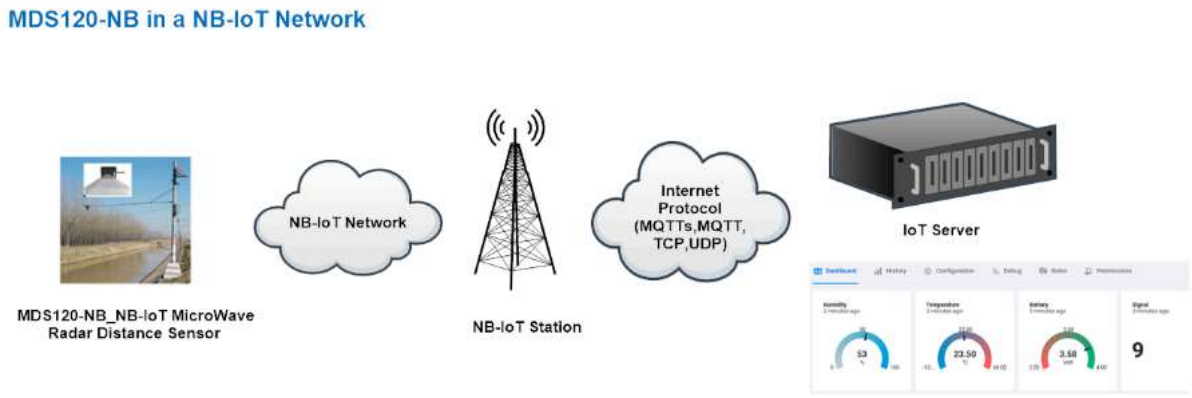


2. Use MDS120-NB to communicate with IoT Server

2.1 Send data to IoT server via NB-IoT network

The MDS120-NB is equipped with a NB-IoT module, the pre-loaded firmware in MDS120-NB will get environment data from sensors and send the value to local N network via the NB-IoT module. The NB-IoT network will forward this value to IoT server via the protocol defined by MDS120-NB.

Below shows the network structure:



There are two version: **-GE** and **-1D** version of MDS120-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 MDS120-NB ser IoT server.

- Install NB-IoT SIM card and configure APN. See instruction of Attach Network (http://wiki.dragino.com/xwiki/bin/view/Main/General%20Configure%20to%20Connect%20to%20IoT%20server%20for%20-NB%20%26%20-NS%20NB-IoT%20models/#H2.AttachNetwork) .
- Set up sensor to point to IoT Server. See instruction of Configure to Connect Different Servers (http://wiki.dragino.com/xwiki/bin/view/Main/General%20Configure%20to%20Connect%20to%20IoT%20server%20for%20-NB%20%26%20-NS%20NB-IoT%20models/#H3.Configuretoconnecttodifferentservers) .

Below shows result of different server as a glance.

Servers	Dash Board	Comments
Node-Red (http://wiki.dragino.com/xwiki/bin/view/Main/General%20Configure%20to%20Connect%20to%20IoT%20server%20for%20-NB%20%26%20-NS%20NB-IoT%20models/#H3.5A0Node-RedA028viaA0MQTT29)		
DataCake (http://wiki.dragino.com/xwiki/bin/view/Main/General%20Configure%20to%20Connect%20to%20IoT%20server%20for%20-NB%20%26%20-NS%20NB-IoT%20models/#H3.4Datacake)		
Tago.IO (http://wiki.dragino.com/xwiki/bin/view/Main/General%20Configure%20to%20Connect%20to%20IoT%20server%20for%20-NB%20%26%20-NS%20NB-IoT%20models/#H3.7A0Tago.ioA028viaA0MQTT29)		
General UDP (http://wiki.dragino.com/xwiki/bin/view/Main/General%20Configure%20to%20Connect%20to%20IoT%20server%20for%20-NB%20%26%20-NS%20NB-IoT%20models/#H3.1GeneralA0UDPA0Connection)	Raw Payload. Need Developer to design Dash Board	

General MQTT (http://wiki.dragino.com/xwiki/bin/view/Main/General%20Configure%20to%20Connect%20to%20IoT%20server%20for%20-NB%20%26%20-NS%20NB-IoT%20models/#H3.2GeneralA0MQTTA0Connection)	Raw Payload. Need Developer to design Dash Board	
ThingSpeak (http://wiki.dragino.com/xwiki/bin/view/Main/General%20Configure%20to%20Connect%20to%20IoT%20server%20for%20-NB%20%26%20-NS%20NB-IoT%20models/#H3.3A0ThingSpeakA028viaA0MQTT29)		
ThingsBoard (http://wiki.dragino.com/xwiki/bin/view/Main/General%20Configure%20to%20Connect%20to%20IoT%20server%20for%20-NB%20%26%20-NS%20NB-IoT%20models/#H3.6A0ThingsBoard.CloudA028viaA0MQTT29)		

1D Version: This version has 1NCE SIM card pre-installed and configure to send value to DataCake. User Just need to select the sensor type in DataCake and Activ MDS120-NB and user will be able to see data in DataCake. See here for DataCake Config Instruction (http://wiki.dragino.com/xwiki/bin/view/Main/General%20Configure%20to%20Connect%20to%20IoT%20server%20for%20-NB%20%26%20-NS%20NB-IoT%20models/#H3.4Datacake) .

2.2 Payload Types

To meet different server requirement, MDS120-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=2,0 // Use UDP Connection & hex Payload

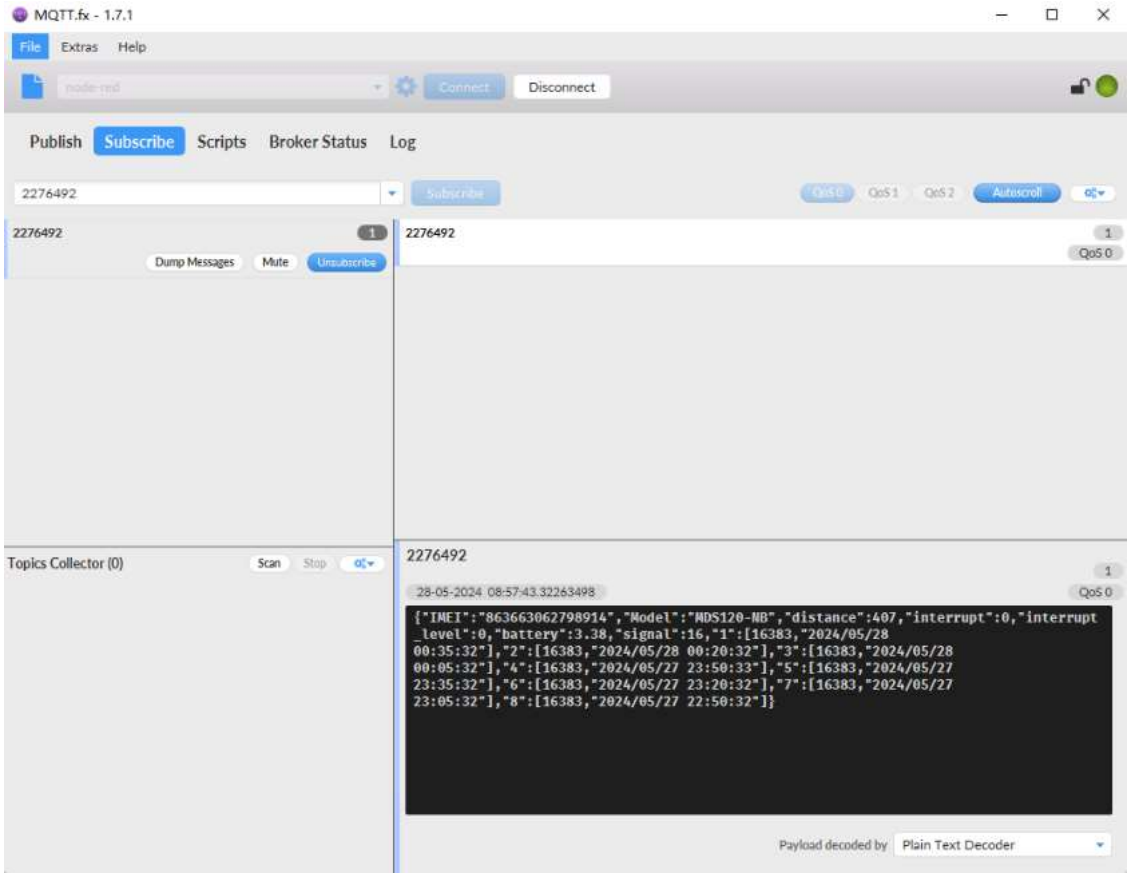
AT+PRO=2,5 // Use UDP Connection & Json Payload

AT+PRO=3,5 // Use MQTT Connection & Json Payload

2.2.1 General Json Format(Type=5)

This is the General Json Format. As below:

{"IMEI":"863663062798914","Model":"MDS120-NB","distance":407,"interrupt":0,"interrupt_level":0,"battery":3.38,"signal":16,"1":[16383,"2024/05/28 00:3
[16383,"2024/05/28 00:20:32"],"3":[16383,"2024/05/28 00:05:32"],"4":[16383,"2024/05/27 23:50:33"],"5":[16383,"2024/05/27 23:35:32"],"6":[16383,"2024/05/2
23:20:32"],"7":[16383,"2024/05/27 23:05:32"],"8":[16383,"2024/05/27 22:50:32"]}



Notice, from above payload:

- Diatance, Interrupt, Interrupt_level, Battery & Signal 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, Sar time.

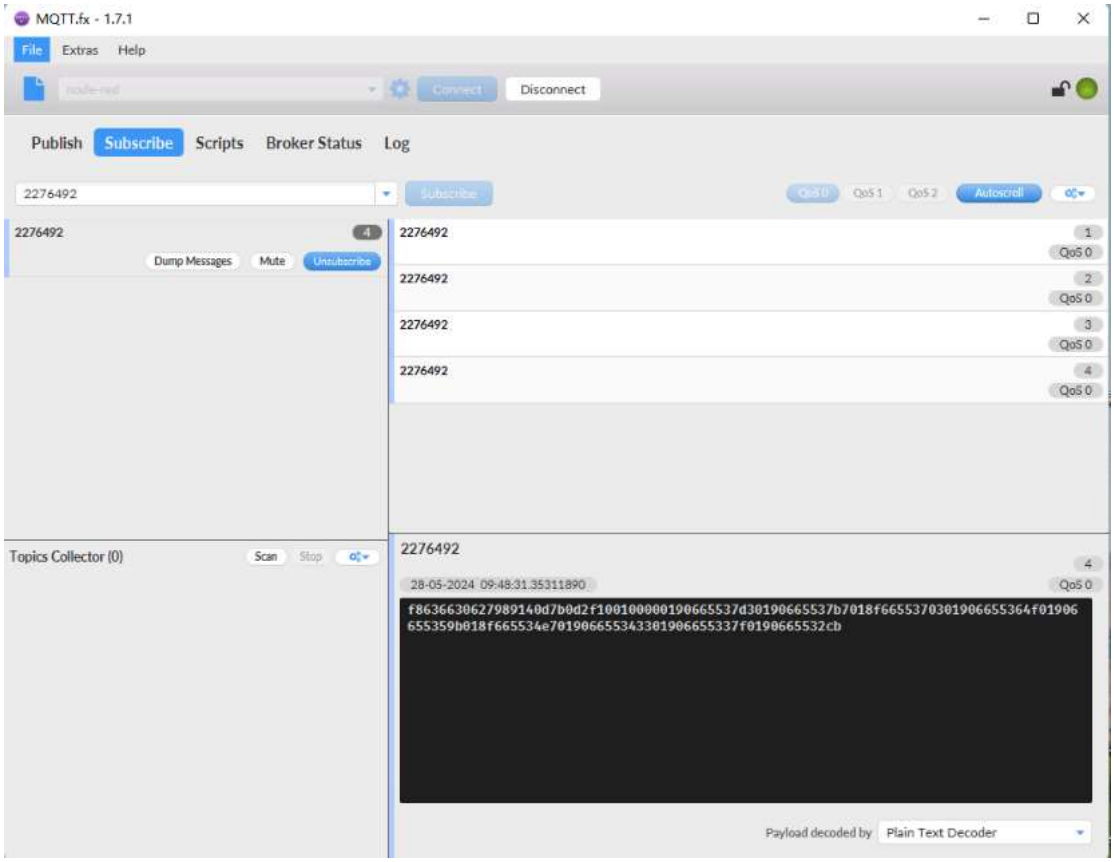
2.2.2 HEX format Payload(Type=0)

This is the HEX Format. As below:

f863663062798914 0d7b 0d2f 10 01 00 00 0190 665537d3 0190 665537b7 018f66553703 01906655364f 01906655359b 018f665534e7 019066553433 01906655337f 0190655532cb

HEX Format for MDS120-NB (AT+NOUD=8)													
f863663062798914		0d7b	0d2f	10	01	00	00	0190	665537d3				
f=IMEI		Version	BAT	Singal	Mod	Interrupt	Interrupt_level	Distance	Timestamp				
8 Bytes		13 Bytes											
0190	665537b7	018f66553703				01906655364f				01906655359b			
Distance	Timestamp	last 2nd data				last 3rd data				last 4th data			
6 Bytes		6 Bytes				6 Bytes				6 Bytes			
018f665534e7		019066553433				01906655337f				0190655532cb			
last 5th data		last 6th data				last 7th data				last 8th data			
6 Bytes		6 Bytes				6 Bytes				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: 0x0d for MDS120-NB

Lower byte: Specify the software version: 0x7b=123, means firmware version 1.2.3

BAT (Battery Info):

Ex1: 0x0DD2 = 3538mV

Signal Strength:

NB-IoT Network signal Strength.

Ex1: 0x15 = 21

0 -113dBm or less

1 -111dBm

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

31 -51dBm or greater

99 Not known or not detectable

Interrupt Pin:

This data field shows if this packet is generated by interrupt or not.

Example:

If byte[0]&0x01=0x00 : Normal uplink packet.

If byte[0]&0x01=0x01 : Interrupt Uplink Packet.

Interrupt Level:

This byte shows whether the interrupt is triggered by a high or low level.

Ex1: 0x00 Interrupt triggered by falling edge (low level)

Ex2: 0x01 Interrupt triggered by rising edge (high level)

Distance:

Ex1: 0xdc8 = 3528 mm

TimeStamp:

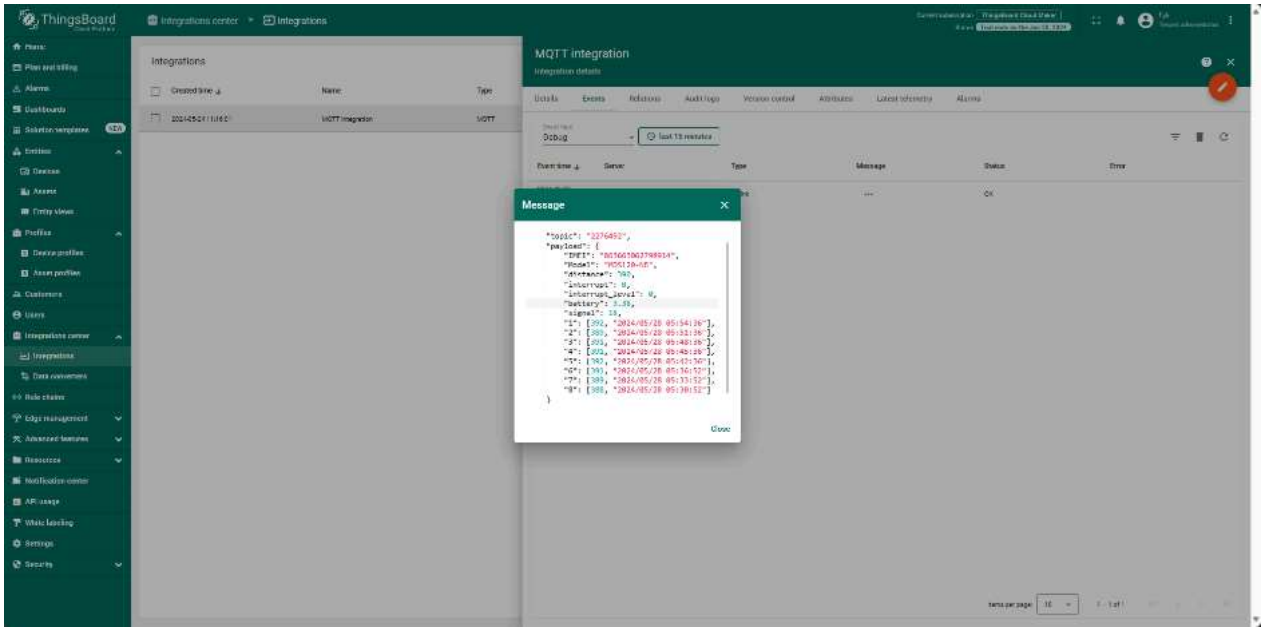
Unit TimeStamp Example: 650d02ff(H) = 1695351551(D)

Put the decimal value into this link(https://www.epochconverter.com) (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": "MDS120-NB",
    "distance": 390,
    "interrupt": 0,
    "interrupt_level": 0,
    "battery": 3.38,
    "signal": 18,
    "1": [392, "2024/05/28 05:54:36"],
    "2": [389, "2024/05/28 05:51:36"],
    "3": [391, "2024/05/28 05:48:36"],
    "4": [391, "2024/05/28 05:45:36"],
    "5": [392, "2024/05/28 05:42:36"],
    "6": [391, "2024/05/28 05:36:52"],
    "7": [389, "2024/05/28 05:33:52"],
    "8": [388, "2024/05/28 05:30:52"]
  }
}
```

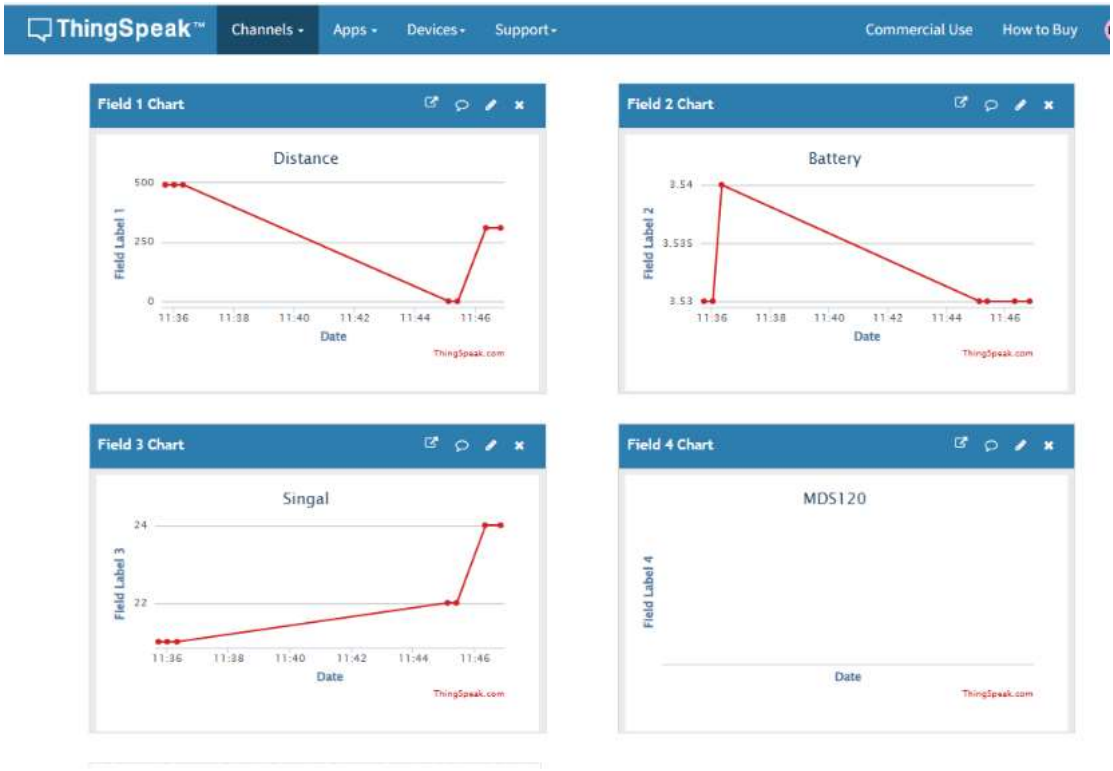
2.2.4 ThingSpeak Payload(Type=1)

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

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

As below:

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



2.3 Uplink Payload

MDS120-NB will uplink payload via NB-IoT with below payload format:

Uplink payload includes in total 22 bytes.

Size(bytes)	**8**	**2**	**2**	**1**	**1**	**1**	**1**	**2**	**4**
Value	f+IMEI	Ver	BAT	Signal Strength	Mod	Interrupt	Interrupt _level	Distance (unit:mm)	Timestamp

If the cache upload mechanism is turned on, you will receive the payload shown in the figure below.

Frame header	**Frame data(1)**	**Frame data(2)**	**F...**	**Frame data(X)**

2.3.1 Battery Info

Check the battery voltage for MDS120-NB.

Ex1: 0x0B45 = 2885mV

Ex2: 0x0B49 = 2889mV

2.3.2 Interrupt

This data field shows if this packet is generated by interrupt or not.

Example:

0x00: Normal uplink packet.

0x01: Interrupt Uplink Packet.

2.3.3 Interrupt_level

This byte shows whether the interrupt is triggered by a high or low level.

Ex1: 0x00 Interrupt triggered by falling edge (low level)

Ex2: 0x01 Interrupt triggered by rising edge (high level)

2.3.4 Distance

Distance between sensor probe to the first object. (unit: mm)

For example, if the data you get from the register is **0x0D 0xC6**, the distance between the sensor and the measured object is **0DC6(H) = 3526 (D) = 3526 mm.**

Notice: The distance has a special value :

0x3FFF: Reading Invalid (exceed the valid range of the probe) or Probe not detected.

2.4 Test Uplink and Change Update Interval

By default, Sensor will send uplinks **every 2 hours** 8

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

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

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

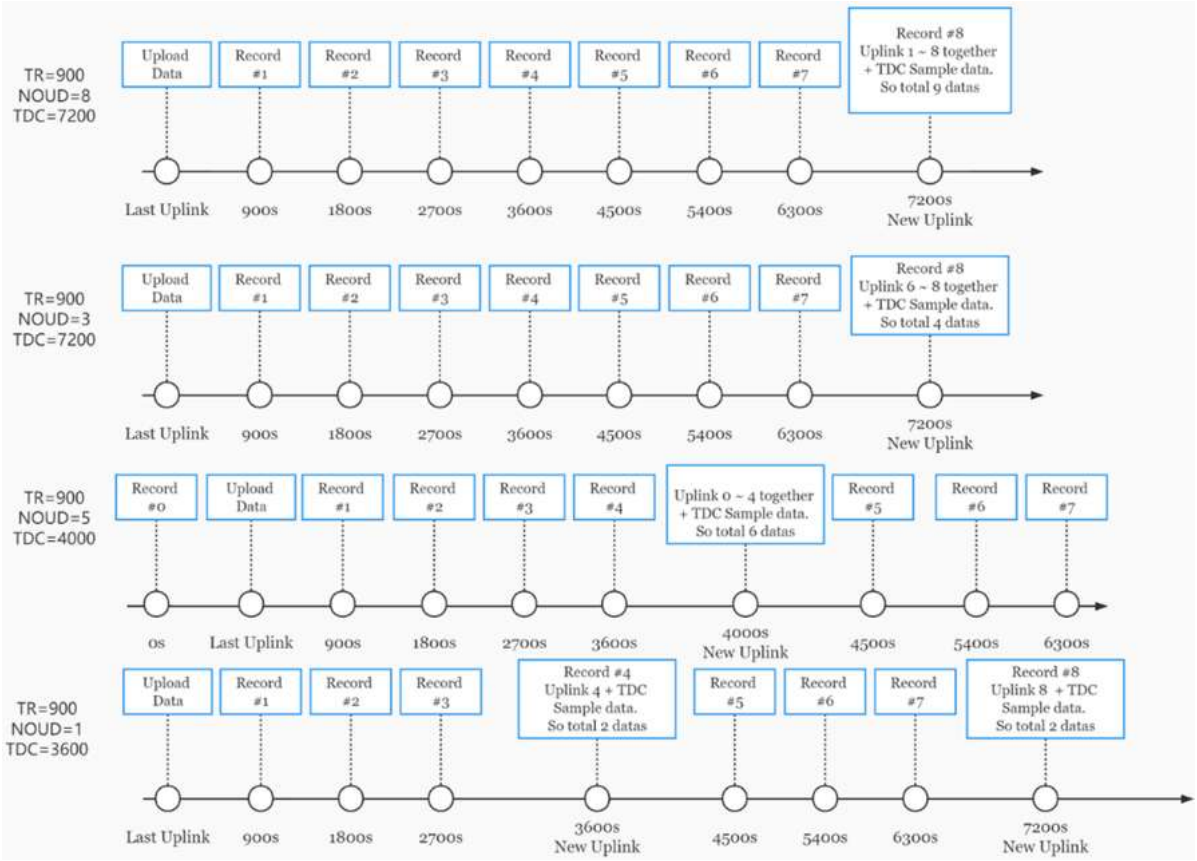
2.5 Multi-Samplings and One uplink

Notice: The AT+NOUD feature is upgraded to Clock Logging, please refer Clock Logging Feature

To save battery life, MDS120-NB will sample temperature & humidity data every 15 minutes and send one uplink every 2 hours. So each uplink it will include 8 sto 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:



2.6 Trggier an uplink by external interrupt

MDS120-NB has an external trigger interrupt function. Users can use the PB15 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

2.7 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 cas use clock loging 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

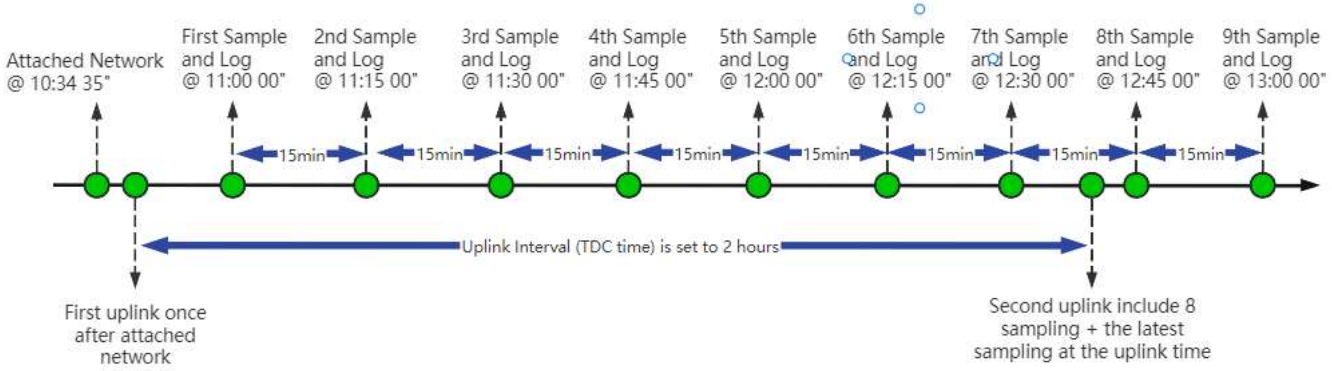
b: Specify First sampling start second: range **(0 ~ 3599, 65535)** // **Note:** If parameter b is set to 65535, the log period starts after the node accesses the netwo sends packets.

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

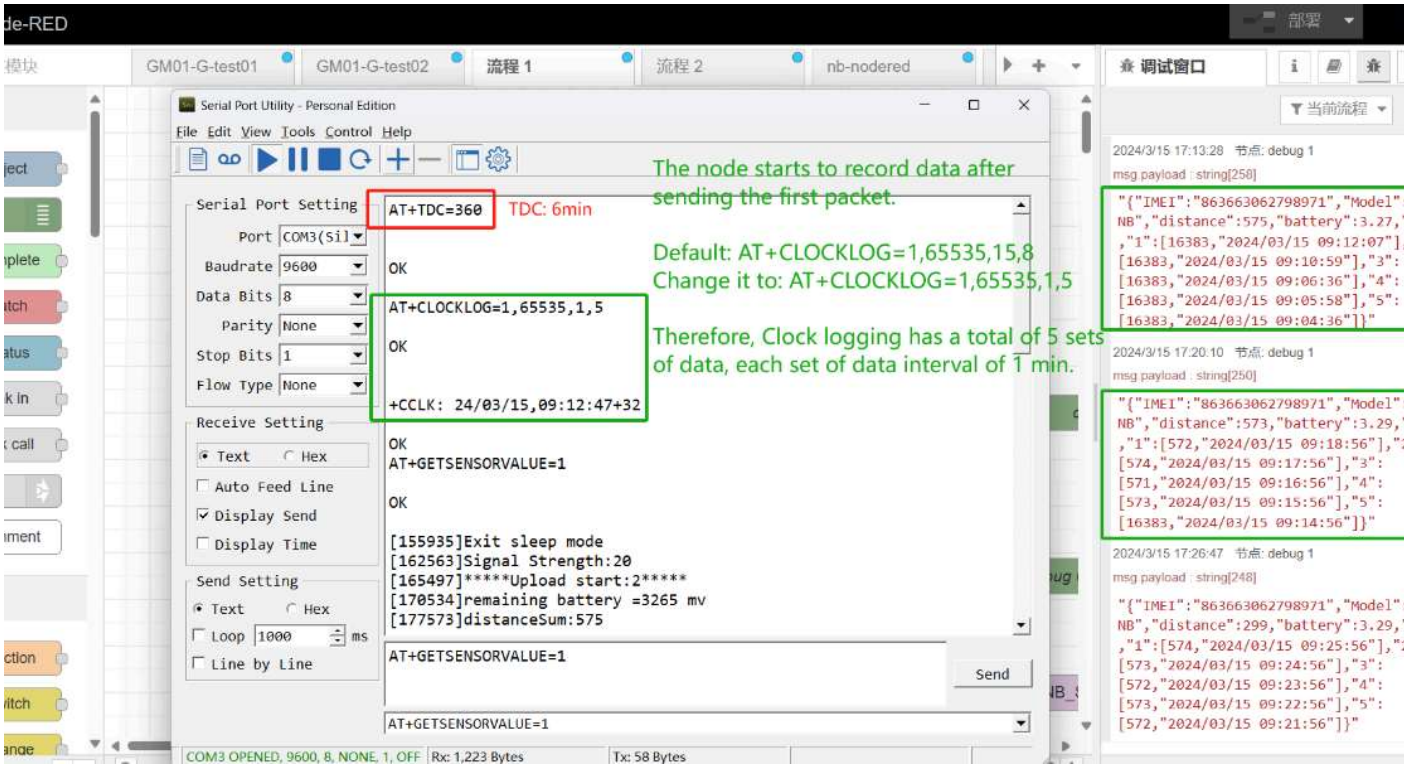
Example: AT+CLOCKLOG=1,0,15,8
Device will log data to memory start from the 0" second (11:00 00" of first hour and then sampling and log every 15 minutes.Every TDC uplink, the uplink payload will consist: Battery info + last 8 memory record with timestamp + the latest sample at uplink time) . See below 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 informatio 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 confi command takes effect only after the node is reset.

- **Downlink command: 0x0A**

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

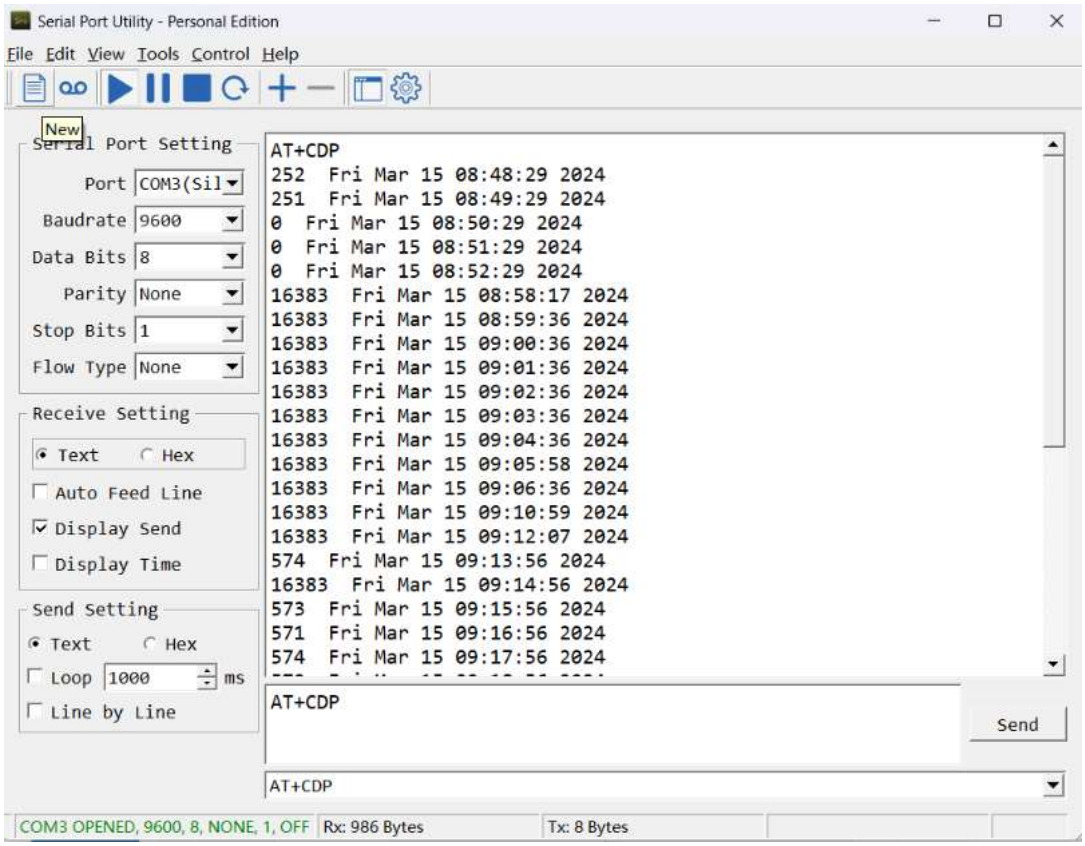
- **Example 1**: Downlink Payload: **0A01FFFF0F08** // Set SHT record time: AT+CLOCKLOG=1,65535,15,8
- **Example 1**: Downlink Payload: **0A0104B00F08** // Set SHT record time: AT+CLOCKLOG=1,1200,15,8

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

2.8 Example Query saved historical records

- **AT command: AT+CDP**

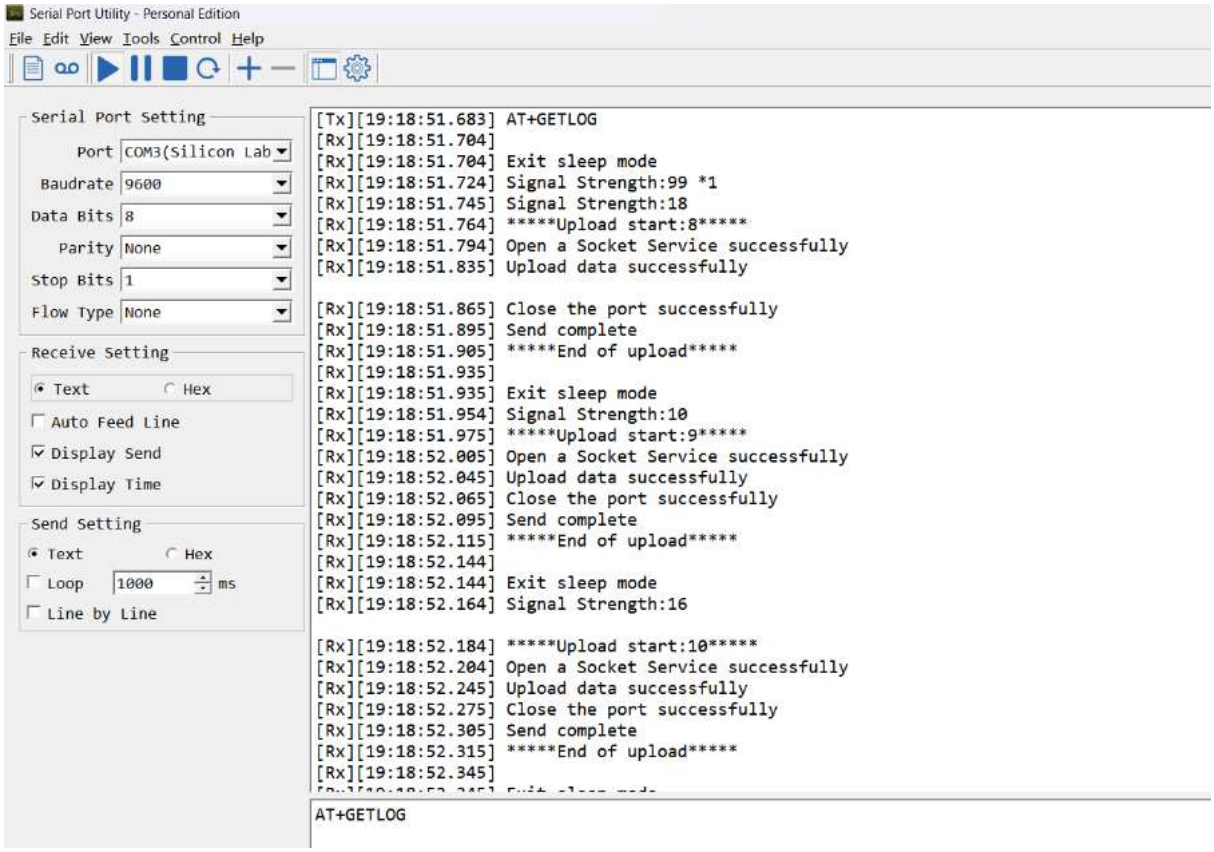
This command can be used to search the saved history, recording up to 32 groups of data, each group of historical data contains a maximum of 100 bytes.



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+LDDSALARM (Range:150mm - 12000mm)

Example: AT+LDDSALARM=500,2000 // Set the alarm threshold

Downlink command: 0x0A

Format: Command Code (0x0A) followed by 4 bytes.

Example: Downlink Payload: **0A 01 F4 07 D0** //AT+LDDSALARM=500,2000

2.12 Get or set the maximum detection distance

Feature,The farthest detection distance can be set to 5m, 10m.

AT Command: AT+SMDD

Command Example	Function	Response
AT+SMDD=?	Displays the current distance parameter	5 OK
AT+SMDD=10	Set detection distance: 5:detection distance is 5m 10:detection distance is 10m	01 08 01 **00** 81 8a OK 00--->successes 01--->fail

Downlink Command: 0x0B

Format: Command Code (0x0B) followed by 1 bytes.

If the downlink payload=B30A, it means that the distance mode of the end node is set to 0x0A=10 (distance of 10m) and the type code is 0B.

- Example 1: Downlink Payload: 0B 05 // Set the measuring distance to 5m
- Example 2: Downlink Payload: 0B 0A // Set the measuring distance to 10m

2.13 Get or set the accuracy level

Feature,Accuracy can be set to: 10mm , 5mm, 2mm.

AT Command: AT+SAL

Command Example	Function	Response
AT+SAL=?	Displays the current accuracy parameters	2 OK
AT+SAL=1	Set accuracy level: 0: 10mm 1:5mm 2:2mm	01 0d 01 **00** 91 8b OK 00--->successes 01--->fail

Downlink Command: 0x0C

Format: Command Code (0x0C) followed by 1 byte.

If the downlink payload=0C00, it means that the precision of the terminal node is set to 0x00=10 (10mm precision) and the type code is 0C.

- Example 1: Downlink Payload: 0C 00 // Accuracy of 10mm
- Example 2: Downlink Payload: 0C 01 // Accuracy of 5mm
- Example 3: Downlink Payload: 0C 02 // Accuracy of 2mm

Note: When the node's accuracy is set to 2mm, the node automatically modifies the maximum detection distance to 2.5m.

2.14 Get or set the speed level

Feature,Sampling speed can be set to: fast, normal, slow.

AT Command: AT+SSL

Command Example	Function	Response
AT+SSL=?	Displays the current sampling rate	1 OK
AT+SSL=1	Set accuracy level: 0: slower 1:ordinary 2:fastest	OK

Downlink Command: 0x0D

Format: Command Code (0x0D) followed by 1 byte.

If the downlink payload=0D01, it means that the sampling speed of the terminal node is set to 0x01=1 (Sampling Speed: Normal) and the type code is 0D.

- Example 1: Downlink Payload: 0D 00 // Sampling speed: slow
- Example 2: Downlink Payload: 0D 01 // Sampling speed: normal

- Example 3: Downlink Payload: 0D 02 // Sampling speed: fast

2.15 Get or Set Command delay of sensors 1

Feature,the response delay of the sensor can be set.

AT Command: AT+CD1EL

Command Example	Function	Response
AT+CD1EL=?	Get the current delay time (ms)	500 OK
AT+CD1EL=500	Set accuracy level	OK

Downlink Command: 0x0E

Format: Command Code (0x0E) followed by 3 bytes.

If the downlink payload=0E01F4, it means that the sampling speed of the terminal node is set to 0x01 F4 (Response delay: 500) and the type code is 0E.

- Example : Downlink Payload: 0E 00 01 F4 // Set the current delay time to: 500ms

Note:

This delay command is the key to whether or not the maximum collection distance of the node can be modified successfully: the following are the recc settings for the two distances:

*** Maximum sampling distance: 5m, can be set to: 500ms delay**

*** Maximum sampling distance: 10m, can be set to: 1000ms delay**

When the setting is unsuccessful with AT command, the serial port will return invalid data: ff od bl bd 00 00, ff means the modification is invalid.

2.16 Get or Set Command delay of sensors 2

Feature,the response delay of the sensor can be set.

AT Command: AT+CD2EL

Command Example	Function	Response
AT+CD2EL=?	Get the current delay time (ms)	1000 OK
AT+CD2EL=1000	Set accuracy level	OK

Downlink Command: 0x0F

Format: Command Code (0x0F) followed by 3 bytes.

If the downlink payload=0F03E8, it means that the sampling speed of the terminal node is set to 0x03 E8 (Response delay: 1000) and the type code is 0F.

- Example : Downlink Payload: 0F 00 03 E8 // Set the current delay time to: 1000ms

Note:

This delay command is the key to successfully modifying the node's maximum acquisition distance: the following are the recommended settings for th distances:

*** Maximum Sampling Distance: 5 meters with 2000ms delay.**

*** Maximum Sampling Distance: 10 meters, can be set to 3000ms delay.**

If the AT command is not successful, the serial port will return invalid data: ff od bl bd 00 00, ff means the modification is invalid.

2.17 Query sensor parameters

Features, query the maximum detection distance, accuracy, sampling speed parameters of the sensor

AT Command: AT+DQUE

Command Example	Function	Response
AT+DQUE=?	Get the maximum detection distance, accuracy, and sampling speed parameters.	01 88 04 01 01 00 00 b4 b4 OK

Returns data parsing:

- 01 ---> Frame header
- 88 ---> Function code
- 04 ---> Total bytes of returned data
- 01 ---> Maximum detection distance is: 10m. (Return 00, then maximum detection distance is: 5
- 01 ---> Detection speed is: normal. (00: fastest; 01: normal; 02: slower)
- 00 ---> Accuracy is: 10mm. (00: 10mm; 1: 5mm, 2: 2mm)
- 00 ---> Condensation function is: weaker. (00: weaker; 01: normal; 02: stronger)
- B4 B4 ---> Checksum

3. Configure MDS120-NB

3.1 Configure Methods

MDS120-NB supports below configure method:

- AT Command via Bluetooth Connection (**Recommended**): BLE Configure Instruction (http://wiki.dragino.com/xwiki/bin/view/Main/BLE%20Bluetooth%20Remote%20Configure/) .
- AT Command via UART Connection : See UART Connection (http://wiki.dragino.com/xwiki/bin/view/Main/UART%20Access%20for%20LoRa%20ST%20v4%20base%20model/#H2.3UARTConnectionforSN50v3basemoth

3.2 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+SERVADDR : Server Address

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

AT+LDATA : Get the last upload data

AT+CDP : Read or Clear cached data

4. Battery & Power Consumption

MDS120-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
(http://wiki.dragino.com/xwiki/bin/view/Main/How%20to%20calculate%20the%20battery%20life%20of%20Dragino%20sensors%3F/) .

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 (https://www.dropbox.com/sh/bhllnli22hb3hko/AAAKVTr3-dyDMm3RclNjgVFE**

Methods to Update Firmware:

- (Recommended way) OTA firmware update via BLE: **Instruction** (http://wiki.dragino.com/xwiki/bin/view/Main/BLE_Firmware_Update_NB_Sensors_BC660K-
- Update through UART TTL interface : **Instruction (http://wiki.dragino.com/xwiki/bin/view/Main/UART_Access_for_NB_ST_BC660K-GL/#H4.2UpdateFirmware28Assumethedevicealreadyhaveabootloader29)** .

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 (https://www.dropbox.com/sh/5f6ssda5fum8rvs/AABT68l8ZzWOvZ5eg2qwOoFda?dl=0)

6.2 How to configure the certificate?

User can can refer to this description (http://wiki.dragino.com/xwiki/bin/view/How%20to%20configure%20the%20certificate%3F/) to configure the certificate.

7. Order Info

Part Number: **MDS120-NB-XX**

XX:

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

1NCE SIM Card NB-IoT network coverage: Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Finland, Germany, Great Britain, Greece, Hungary, Irelar
Latvia, Malta, Netherlands, Norway, Puerto Rico, Russia, Slovak , Republic, Slovenia, Spain, Sweden, Switzerland, Taiwan, USA, US Virgin Islands

8. Packing Info

Package Includes:

- MDS120-NB NB-IoT Microwave Radar distance 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 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 to Support@dragino.cc (mailto:Support@dragino.cc) .

0 Tags:

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