General Configure/Commands to Connect to IoT server for -NB & -NS NB-IoT models

last modified by Mengting Qiu

on 2024/08/28 14:44

Table of Contents

1. The use of this guideline	5
2. Attach Network	. 5
2.1 General Configure to attach network	. 5
2.2 Speed Up Network Attach time	6
3. Configure to connect to different servers	. 7
3.1 General UDP Connection	7
3.1.1 Simulate UDP Connection by PC tool	7
3.1.2 Configure NB-IoT Sensor	7
3.2 General MQTT Connection	8
3.3 ThingSpeak (via MQTT)	10
3.3.1 Get MQTT Credentials	10
3.3.2 Simulate with MQTT.fx	12
3.3.3 Configure NB-IoT Sensor for connection	15
3.4 Datacake	17
3.4.1 For device Already has template	18
3.4.2 For Device already registered in DataCake before shipped	23
3.4.3 Manual Add Decoder in DataCake (don't use the template in DataCake)	26
3.4.4 For device have not configured to connect to DataCake	35
3.5 Node-Red (via MQTT)	35
3.5.1 Configure Node-Red	35
3.5.2 Simulate Connection	40
3.5.3 Configure NB-IoT Sensors	42
3.6 ThingsBoard Cloud (via MOTT)	42
3.6.1 Configure ThingsBoard	42
3.6.2 Simulate with MOTT fx	49
3.6.3 Configure NB-IoT Sensor	51
3.7 ThingsBoard Cloud (via COAP)	53
3.7.1 Configure ThingsBoard	53
3.7.2 Node Configuration (Example: Connecting to the Thingsboard platform)	58
3.8 Tago in (via MOTT)	61
381 Craste davice & Get Cradentials	61
3.8.2 Simulato with MOTT fv	. 01 64
	66
3.9 TCP Connection	67
3.10 AWS Connection	68
A MOTT/IIDD/TCD downlink	60
	68
	72
5.1 What is the usage of Multi Sampling and One Unlink?	72
5.1 What is the usage of Nutlin sampling and One Opinity :	72
5.2 Why the upmin 550N format is not standard :	73
6.1 Checklist for debuging Natwork Connection issue. Signal Stronght:00 issue	73
6.2 Issue: "NRIOT did not respond"	73
6.3 Issue: "Eailed to read MSI number"	75
6.4 Why comparing the AT Command is slow in repare?	75
6.5 What is the Dewelink Command by the NR device?	76
	76
	76
6.6 How to obtain davice logs?	70
6.7 How to find the AT Command December of lect?	ו ו דד
Why can't the paceword accore AT command after upgrade/ NIP/2	11 77
Version Confirmation	11 70
VEISION OOMINMANUN	10 70
UNITI CONTECTION AND INTERVALE UPDATE METHODS	10

query the password via STM32CubeProgrammer	78
Special case	80

Table of Contents:

- <u>1. The use of this guideline</u>
- <u>2. Attach Network</u>
 - <u>2.1 General Configure to attach network</u>
 - 2.2 Speed Up Network Attach time
- <u>3. Configure to connect to different servers</u>
 - <u>3.1 General UDP Connection</u>
 - <u>3.1.1 Simulate UDP Connection by PC tool</u>
 - <u>3.1.2 Configure NB-IoT Sensor</u>
 - <u>3.1.2.1 AT Commands</u>
 - <u>3.1.2.2 Uplink Example</u>
 - <u>3.2 General MQTT Connection</u>
 - <u>3.3 ThingSpeak (via MQTT)</u>
 - <u>3.3.1 Get MQTT Credentials</u>
 - 3.3.2 Simulate with MQTT.fx
 - <u>3.3.2.1 Establish MQTT Connection</u>
 - 3.3.2.2 Publish Data to ThingSpeak Channel
 - <u>3.3.3 Configure NB-IoT Sensor for connection</u>
 - <u>3.3.3.1 AT Commands:</u>
 - 3.3.3.2 Uplink Examples
 - 3.3.3.3 Map fields to sensor value
 - 3.4 Datacake
 - 3.4.1 For device Already has template
 - <u>3.4.1.1 Create Device</u>
 - 3.4.2 For Device already registered in DataCake before shipped
 - 3.4.2.1 Scan QR Code to get the device info
 - 3.4.2.2 Claim Device to User Account
 - 3.4.3 Manual Add Decoder in DataCake (don't use the template in DataCake)
 - <u>3.4.4 For device have not configured to connect to DataCake</u>
 - 3.5 Node-Red (via MQTT)
 - 3.5.1 Configure Node-Red
 - 3.5.2 Simulate Connection
 - <u>3.5.3 Configure NB-IoT Sensors</u>
 - 3.6 ThingsBoard.Cloud (via MQTT)
 - 3.6.1 Configure ThingsBoard
 - 3.6.1.1 Create Device
 - 3.6.1.2 Create Uplink & Downlink Converter
 - <u>3.6.1.3 MQTT Integration Setup</u>
 - <u>3.6.2 Simulate with MQTT.fx</u>
 - 3.6.3 Configure NB-IoT Sensor
 - 3.7 ThingsBoard.Cloud (via COAP)
 - <u>3.7.1 Configure ThingsBoard</u>
 - 3.7.1.1 Create Uplink & Downlink Converter
 - <u>3.7.1.2 COAP Integration Setup</u>
 - 3.7.1.3 Add COAP Integration
 - General Configure to Connect to IoT server for -NB & -NS NB-IoT models
 - 3.7.2 Node Configuration(Example: Connecting to the Thingsboard platform)
 - <u>3.7.2.1 Instruction Description</u>
 - <u>3.8 Tago.io (via MQTT)</u>
 - <u>3.8.1 Create device & Get Credentials</u>
 - 3.8.2 Simulate with MQTT.fx
 - <u>3.8.3 tago data</u>
 - <u>3.9 TCP Connection</u>
 - <u>3.10 AWS Connection</u>
- <u>4. MQTT/UDP/TCP downlink</u>
- <u>4.1 MQTT (via MQTT.fx)</u>
- <u>5. FAQ</u>
 - 5.1 What is the usage of Multi Sampling and One Uplink?
 - 5.2 Why the uplink JSON format is not standard?

• 6. Trouble Shooting:

- 6.1 Checklist for debuging Network Connection issue. Signal Strenght:99 issue.
- 6.2 Issue: "NBIOT did not respond"
- 6.3 Issue: "Failed to read! MSI number"
- 6.4 Why sometime the AT Command is slow in reponse?
- 6.5 What is the Downlink Command by the NB device?
 - <u>UDP:</u>
 - <u>MQTT:</u>
- <u>6.6 How to obtain device logs?</u>
- 6.7 How to find the AT Command Password if lost?
 - Why can't the password access AT command after upgrade(-NB)?
 - Version Confirmation
 - UART connection and firmware update methods
 - query the password via STM32CubeProgrammer
 - <u>Special case</u>

1. The use of this guideline

This configure instruction is for Dragino NB-IoT models with -NB or -NS suffix, for example DDS75-NB. These models use the same NB-IoT Module <u>BC660K-GL</u> and has the same software structure. The have the same configure instruction to different IoT servers. Use can follow the instruction here to see how to configure to connect to those servers.

2. Attach Network

2.1 General Configure to attach network

To attache NB-IoT sensors to NB-IoT Network, You need to:

- 1. Get a NB-IoT SIM card from Service Provider. (Not the same as the SIM card we use in mobile phone)
- 2. Power Off End Node (See below for the power off/on position)
- 3. Insert the SIM card to Sensor. (See below for direction)
- 4. Power On End Node
- 5. Configure APN in the sensor (AT+APN=<APN>), example AT+APN=iot.1nce.net



Take out Jumper to power off Put Jumper to power on



After doing above, the NB-IoT Sensors should be able to attach to NB-IoT network .

The -NB and -NS models support LTE Cat NB2, with below frequency band: multiple frequency bands of B1/ B2/B3/B4/B5/B8/B12/B13/B14/B17/B18/B19/B20/B25/B28/B66/B70/B85. Make sure you use a the NB-IoT SIM card.

SIM Provider	AT+APN=	NB-IoT Coverage
1NCE	iot.1nce.net	Coverage Reference Link
		Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Finlan Latvia, Malta, Netherlands, Norway, Puerto Rico, Russia, Slovak , Repu UK, US Virgin Islands
China Mobile	No need configure	China Mainland, HongKong
China Telecom	ctnb	China Mainland

2.2 Speed Up Network Attach time

BC660K-GL supports multi bands B1/B2/B3/B4/B5/B8/B12/B13/B14/B17/B18/B19/B20/B25/B28/B66/B70/ B85. It will search one by one and try to attach, this will take a lot of time and even cause attach fail and show Signal Strenght:99. User can lock the band to specify band for its operator to make this faster.

```
AT+QBAND? // Check what is the current used frequency band
AT+QBAND=1,4 // Set to use 1 frequency band. Band4
Europe General AT+QBAND=2,8,20 // Set to use 2 frequency bands. Band 8 and Band 20
Global General : AT+QBAND=10,8,20,28,2,4,12,13,66,85,5
```

```
VerizonAT+QBAND=1,13AT&TAT+QBAND=3,12,4,2TelstraAT+QBAND=1,28SoftbandAT+QBAND=2,3,8
```

After connection is successful, user can use AT+QENG=0 to check which band is actually in used.

By default, device will search network for 5 minutes. User can set the time to 10 minutes by AT+CSQTIME=10 so it can search longer.

See bands used for different provider: NB-IoT Deployment , Bands, Operator list

3. Configure to connect to different servers

3.1 General UDP Connection

The NB-IoT Sensor can send packet to server use UDP protocol.

3.1.1 Simulate UDP Connection by PC tool

We can use PC tool to simulate UDP connection to make sure server works ok.

(1) - SecureCRT	-	٥	\times
ew <u>O</u> ptions <u>T</u> ransfer	<u>Script</u> Tools <u>Window</u> <u>H</u> elp		
Enter host <alt+r></alt+r>	🐚 🛍 🗛 🍠 🐨 💥 📍 @ 🗃		
nager 🛛 🕂 🗙	▼ 119.91.62.30 (1) × ▼ SFTP-119.91.62.30 (1)		٩
I ≥ Construction in the image of the ima	<pre>[-bash: syntax error near unexpected token '(' [root@W-8-3-centos -]# python3 udp_server.py Traceback (most recent call last): File "udp_server.py", line 7, in <module> s.bind([10.0.8.3', 9696]) OSError: [Erron 98] Address already in use [root@W-8-3-centos ~]# python3 udp_server.py Waiting for data Received b'\rf8gxppG\x10q\x00\x85\x0c\x95\x16\x01\x00\x00\x01\x00\x05\x14\x00\x00d\xc8\xb6\x90' from ('221.178.: 37221). Reply:b'\xf8gxppG\x10q\x00\x85\x0c\xa0\x17\x01\x00\x00\x01\x00\x25\x14\x00\x00d\xc8\xb6\x90' Received b'\xf8gxppG\x10q\x00\x85\x0c\xa0\x17\x01\x00\x00\x01\x00\x25\x14\x00\x00d\xc8\xbb\kb' from ('221.178.: 37234). Reply:b'\xf8gxppG\x10q\x00\x85\x0c\xa0\x17\x01\x00\x00\x01\x00\x05\x14\x00\x00d\xc8\xb9\xb' Received b'\xf8gxppG\x10q\x00\x85\x0c\xa0\x17\x01\x00\x00\x01\x00\x05\x14\x00\x00d\xc8\xb9\xb' Received b'\xf8gxppG\x10q\x00\x85\x0c\xa0\x17\x01\x00\x00\x01\x00\x05\x14\x00\x00d\xc8\xb9\xb' Received b'\xf8gxppG\x10q\x00\x85\x0c\xa0\x12\x01\x00\x00\x00\x01\x00\x05\x14\x00\x00d\xc8\xb9\xd9' Received b'\xf8gxppG\x10q\x00\x85\x0c\xa0\x12\x01\x00\x00\x00\x01\x00\x05\x14\x00\x00d\xc8\xb9\xd9' Received b'\xf8gxppG\x10q\x00\x85\x0c\xa0\x12\x01\x00\x00\x00\x00\x05\x14\x00\x00d\xc8\xb9\xd9' Received b'\xf8gxppG\x10q\x00\x85\x0c\xa0\x12\x01\x00\x00\x00\x00\x05\x14\x00\x00d\xc8\xb9\xd9' Received b'\xf8gxppG\x10q\x00\x85\x0c\xa0\x12\x01\x00\x00\x00\x00\x05\x14\x00\x00d\xc8\xb9\xd9' Received b'\xf8gxppG\x10q\x00\x85\x0c\xa0\x12\x01\x00\x00\x00\x00\x05\x14\x00\x00d\xc8\xb9\xd9' Received b'\xf8gxppG\x10q\x00\x85\x0c\xa0\x11\x01\x00\x00\x00\x00\x05\x14\x00\x00d\xc8\xb9\xd9' Received b'\xf8gxppG\x10q\x00\x85\x0c\xa0\x11\x01\x00\x00\x00\x01\x00\x00\x00\x0</module></pre>	127.194' 127.194' 127.194' 127.194' 127.194'	·, ·, ·, ·,
oxy22.rt3.io oxy22.rt3.io (1) oxy22.rt3.io (2) oxy22.rt3.io (2) oxy22.rt3.io (3) oxy22.rt3.io (4) rial-COM3	37234). Reply:b'\xf8gxpPG\x10q\x00\x85\x0c\xa0\x1b\x01\x00\x00\x01\x00\xb6\x05\x14\x00\x00d\xc8\xba\x1f' Received b'\xf8gxpPG\x10q\x00\x85\x0c\xa0\x1c\x01\x00\x00\x01\x00\xb7\x05\x14\x00\x00d\xc8\xbaG' Received b'\xf8gxpPG\x10q\x00\x85\x0c\xa0\x1c\x01\x00\x00\x01\x00\xb7\x05\x14\x00\x00d\xc8\xbaG' Received b'\xf8gxpPG\x10q\x00\x85\x0c\xa2\x1d\x01\x00\x00\x01\x00\xb7\x05\x14\x00\x00d\xc8\xba\xbf' from ('221.178.127 37234). Received b'\xf8gxpPG\x10q\x00\x85\x0c\xa2\x1d\x01\x00\x00\x01\x00\xb7\x05\x14\x00\x00d\xc8\xba\xbf' from ('221.178.127 37234). Reply:b'\xf8gxpPG\x10q\x00\x85\x0c\xa2\x1d\x01\x00\x00\x01\x00\xb7\x05\x14\x00\x00d\xc8\xba\xbf' I	.194', 3 L27.194'	372 ',
inds to active session			

3.1.2 Configure NB-IoT Sensor

3.1.2.1 AT Commands

AT Commands:

- AT+PRO=2,0 // Set to use UDP protocol to uplink ,Payload Type select Hex payload
- AT+SERVADDR=120.24.4.116,5601 // Set UDP server address and port

	AT+NAME866207053462762
1	[816]reboot error:NRST!
1	DRAGINO SN50V3-NB NB-IOT Sensor Node
	Image Version: v1.0.0
	NB-IoT Stack : D-BC660K-001
	Protocol in Used: UDP
	[7669]NBIOT has responded.
1	[12001]Echo mode turned off successfully.
	[13347]Disable the reporting of deep sleep event URC.
1	[14706]Model information:BC660K-GL.
1	[16046]The IMEI number is:866207053462762.
	[17394]The IMSI number is:460083823106206.
	[19442]Set the data format for sending and receiving.
	Currently set frequency band: 1,2,3,4,5,8,12,13,17,18,19,20,25,28,66,70,85
	[26484]Signal Strength:24
	[31518]PSM mode configured
	[34151]DNS configuration is successful
	[40195]No DNS resolution required
	[41233]*****Upload start:0*****
	[41769]remaining battery =3245 mv
	[42563]DS18B20(1) temp is -0.06
	[42666]adc_mV(1):53.00
s	[42693]No I2C device detected
	[46230]Open a Socket Service successfully
	[53283]Datagram is sent by RF
	[54317]Send complete
	[55341]*****End of upload*****
	AT+PWRM2

3.1.2.2 Uplink Example



3.2 General MQTT Connection

The NB-IoT Sensor can send packet to server use MQTT protocol.

Below are the commands.

AT Commands:

- AT+PRO=3,0 // Set to use MQTT protocol to uplink, Payload Type select Hex payload.
- 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 // Set the password of MQTT AT+PWD=PWD • AT+PUBTOPIC=NSE01 PUB // Set the sending topic of MQTT • AT+SUBTOPIC=NSE01 SUB // Set the subscription topic of MQTT DRAGINO SN50V3-NB NB-IoT Sensor Node Image Version: v1.0.0 NB-IoT Stack : D-BC660K-001 Protocol in Used: MQTT [7370]NBIOT has responded. [11701]Echo mode turned off successfully. [13047]Disable the reporting of deep sleep event URC. [14406]Model information:BC660K-GL. [15746]The IMEI number is:866207053462762. [17094]The IMSI number is:460083823106206. [19142]Set the data format for sending and receiving. Currently set frequency band: 1,2,3,4,5,8,12,13,17,18,19,20,25,28,66,70,85 [26184]Signal Strength:25 [31218]PSM mode configured [33851]DNS configuration is successful [39895]No DNS resolution required [40933]*****Upload start:0***** [41469]remaining battery =3245 mv [42263]DS18B20(1) temp is -0.06 [42366]adc mV(1):56.00 [43471]No I2C device detected [48909]Opened the MQTT client network successfully [52467]Successfully connected to the server [57522]Subscribe to topic successfully [61068]Close the port successfully AT+PWRM2 [62269]Send complete [63293]****End of upload*****

MQTT.fx - 1.7.1				- (
File Extras Help					
onenet_mqtt_new	- 🏠 Connect D	isconnect			•
Publish Subscribe Scrip	pts Broker Status Log				
pub	▼ Subscribe		Qo50 Qo51 Qo52	Autoscroll	
pub	1	pub			Qo
Topics Collector (0)	Scan Stop Ofv	nuh			
		28-07-2023 14-23-43-51823972 f86620705346276280640cad1801800008080338000808064c35ed9			Qo
					-

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

3.3 ThingSpeak (via MQTT)

3.3.1 Get MQTT Credentials

ThingSpeak connection uses MQTT Connection. So we need to get MQTT Credentials first. You need to point MQTT Devices to The

_J ThingSpeak ™ ci	hannels - Apps - Devices - Su	pport ~	Commercial Use	How to Buy
	s			
Device Details:	Authorized Channels and Pe	rmissions:	MQTT Client ID:	
	dragino-test (396640) 👞	✓ publish ✓ subscribe	JCoZK 4tBQQHMSw	Edit

Channels -	Apps 🗸	Devices -	Support -		
0-Test					
-Test					
n					
BC660-Test					
Enter option	al informatio	n about this de	vice for later reference		
JCoZKTc JCoZKT	4tBQQ QQ	HMSw HMSw		6	
•••••	••••	•••••		ß	c
	i0-Test -Test BC660-Test Enter option Is to publish an JCoZKTC JCoZKT	i0-Test -Test BC660-Test Enter optional information Is to publish and subscriber JCoZKTC 4tBQQ JCoZKT, QQ	i0-Test -Test BC660-Test Enter optional information about this dev Is to publish and subscribe to ThingSpea JCoZKTc 4tBQQHMSw JCoZKT QQHMSw	iO-Test -Test BC660-Test Enter optional information about this device for later reference Is to publish and subscribe to ThingSpeak channels. Learn N JCoZKTC 4tBQQHMSw	iO-Test -Test BC660-Test Enter optional information about this device for later reference. Is to publish and subscribe to ThingSpeak channels. Learn More JCoZKTC 4tBQQHMSW

3.3.2 Simulate with MQTT.fx

3.3.2.1 Establish MQTT Connection

After we got MQTT Credentials, we can first simulate with PC tool MQTT.fx tool to see if the Credentials and settings are fine.

Profile Name	ThingSpeak	
Profile Type	MQTT Broker	
MQTT Broker Profile Settings		
Broker Address	mqtt3.thingspeak.com	
Broker Port	1883	
Client ID	JCoZKTcOCzYI 3QQHMSw	Generate
General User Credentials	SSL/TLS Proxy LWT	
User Name	JCoZKT)h4tBQQHMSw	
Password	•••••	

- Broker Address: mqtt3.thingspeak.com
- Broker Port: 1883
- Client ID: <Your ThingSpeak MQTT ClientID>
- User Name: <Your ThingSpeak MQTT User Name>
- Password: <Your ThingSpeak MQTT Password>

3.3.2.2 Publish Data to ThingSpeak Channel

🖵 ThingSpeak	[™] Channels -	Apps 🗸	Devices -	Support	•
Channel ID: 396640 Author: dragino1 Access: Private	st				
Private View Public V	iew Channel S	ettings S	Sharing	API Keys	Data Import / Export
Add Visualizations	Add Widget	ts 🛛 🖬 E	xport recen	ıt data	



In MQTT.fx, we can publish below info:

0

Jan '23

Mar '23

Date

May '23

- Topic: channels/YOUR_CHANNEL_ID/publish
- Payload: field1=63&field2=67&status=MQTTPUBLISH

Where 63 and 67 are the value to be published to field1 & field2.

Result: dragino-test Channel ID: 396640 Author: dragino1 Access: Private Private View **Public View Channel Settings** API Keys Sharing Data Import / Export Add Visualizations H Add Widgets Export recent data Channel 1 of 4 < > **Channel Stats** Created: 5 years ago Last entry: less than a minute ago Entries: 71580 Field 1 Chart Field 2 Chart Temperature Humidity 200 Temperature(C) **Humidit** 100 67

13:16:56

13:16:57

13:16:58

Date

13:16:59

13:17:(

3.3.3 Configure NB-IoT Sensor for connection

3.3.3.1 AT Commands:

In the NB-IoT, we can run below commands so to publish the channels like MQTT.fx

- AT+PRO=3,1 // Set to use ThingSpeak Server and Related Payload
- AT+CLIENT=<Your ThingSpeak MQTT ClientID>
- AT+UNAME=<Your ThingSpeak MQTT User Name>
- AT+PWD=<Your ThingSpeak MQTT Password>
- AT+PUBTOPIC=<YOUR_CHANNEL_ID>
- AT+SUBTOPIC=<YOUR_CHANNEL_ID>

3.3.3.2 Uplink Examples



For SE01-NB

For DDS20-NB

For DDS45-NB

For DDS75-NB

For NMDS120-NB

For SPH01-NB

For NLM01-NB

For NMDS200-NB

For CPN01-NB

For DS03A-NB

For SN50V3-NB

3.3.3.3 Map fields to sensor value

When NB-

IoT sensor upload to ThingSpeak. The payload already specify which fileds related to which sensor value. Use need to create fileds in

dragino-test			
Channel ID: 396640 Author: dragino1 Access: Private			
Private View Public Viev	v Channel Settings	Sharing API Keys	Data Import / Export
Channel Settir	igs		Help
Percentage complete	30%		Channels store all the data that a ThingSpeak application collects. Each channel includes eight fields that can hold any type of data, plus three fields for location data and one for
Channel ID	396640		status data. Once you collect data in a channel, you can use ThingSpeak apps to analyze and visualize it.
Name	dragino-test		Channel Settings
Description		h	 Percentage complete: Calculated based on data entered into the various fields of a channel. Enter the name, description, location, URL, video, and tags to complete your channel.
Field 1	Temperature		Channel Name: Enter a unique name for the ThingSpeak channel.
			Description: Enter a description of the ThingSpeak channel.
Field 2	Humidity		 Field#: Check the box to enable the field, and enter a field name. Each ThingSpeak channel can have up to 8 fields.

Home - General Configure/Commands to Connect to IoT server for -NB & -NS NB-IoT models



Below is the NB-IoT Product Table show the mapping.

	Field1	Field2	Field3	Field
S31x-NB	Temperature	Humidity	Battery	RSS
SE01-NB	Temperature	Humidity	conduct	diele
DDS20-NB	distance	Battery	RSSI	
DDS45-NB	distance	Battery	RSSI	
DDS75-NB	distance	Battery	RSSI	
NMDS120-NB	distance	Battery	RSSI	
SPH01-NB	ph	Temperature	Battery	RSS
NLM01-NB	Humidity	Temperature	Battery	RSS
NMDS200-NB	distance1	distance2	Battery	RSS
CPN01-NB	alarm	count	door open duration	calc
DS03A-NB	level	alarm	pb14door open num	pb1
SN50V3-NB mod1	mod	Battery	RSSI	DS1
SN50V3-NB mod2	mod	Battery	RSSI	DS1
SN50V3-NB mod3	mod	Battery	RSSI	adc
SN50V3-NB mod4	mod	Battery	RSSI	DS1
SN50V3-NB mod5	mod	Battery	RSSI	DS1
SN50V3-NB mod6	mod	Battery	RSSI	coui

3.4 Datacake

Dragino NB-IoT sensors has its template in Datacake Platform. There are two version for NB Sensor,

As example for S31B-NB. there are two versions: S31B-NB-1D and S31B-NB-GE.

- S31B-NB-1D: This version have pre-configure DataCake connection. User just need to Power on this device, it will auto connect send data to DataCake Server.
- S31B-NB-GE: This verson doesn't have pre-configure Datacake connection. User need to enter the AT Commands to connect to Datacake. See below for instruction.

3.4.1 For device Already has template

3.4.1.1 Create Device

Add Device in DataCake.

Dragino NB-loT	DATACAKE							
David.huang@dra	Fleet > D	evices						
+ Add Dashboard 😵	Devices			Q Se	arch	Columns 🗸	• •	Add Device
Devices	i⊟ List	🖽 Grid 🚺 Ma	ap					
Reports		_						
온 Cake Red								Actions 🗸
음의 Members		DEVICE	PRIMARY	SECONDARY	DEVICE SIGNAL	DEVICE BATTERY		
€ [⊕] Rules								
Workspace	•	867787051528614	14.3 °C	91 %	13	3.57 Volt	•	
Integrations	•	f847de7ad152dead	0 °C	0 %	0	0 Volt	•	
🟷 White Label		f867787051528176	23.4 °C	53.2 %	10	3.58 Volt	• :	
🖄 Billing	·							
8º Add-Ons	•	f867de7ad152dead	N/A	N/A	N/A	N/A	• :	

Home - General Configure/Commands to Connect to IoT server for -NB & -NS NB-IoT models



Choose the correct model from template.

Product	STEP 2 Devices	STEP 3 Plan
Datacake product You can add devices to an existing product	: on Datacake, or create a new empty produ	ct. Products allow you to share the same
configuration (fields, dashboard and more)	between devices.	
Existing product Add devices to an existing product	New product Create a new empty product	New Product from template Create new product from a template
Dragino NB-IoT Temperature and Hui	midity Sensor UDP	

Fill Device ID. The device ID needs to be filled in with IMEI, and a prefix of 'f' needs to be added.

Product	STEP 2 Devices		STEP 3 Plan	
Add Devices You can add one or more Dragin	o NB-IoT devices at a time. De	vices are identified by thei	r device IDs.	
DEVICE ID	і <mark>теі</mark> _{NAME}	LOCATION	TAGS	
@ f867787051528176	Please enter a device name	Location	O Add tag	
L Add another device				-





3.4.2 For Device already registered in DataCake before shipped

3.4.2.1 Scan QR Code to get the device info

Users can use their phones or computers to scan QR codes to obtain device data information.





3.4.2.2 Claim Device to User Account

By Default, the device is registered in Dragino's DataCake Account. User can Claim it to his account.

3.4.3 Manual Add Decoder in DataCake (don't use the template in DataCake)

Step1: Add a device

DA	TACAKE							
Fleet > De	evices							
Devices						Q Search	Columns 🗸	+ Add Device
i⊟ List	🖽 Grid 🛛 Map							
								Actions 🗸
	DEVICE	PRIMARY	SECONDARY =	DEVICE SIGNAL	DEVICE BATTERY			
	nds03a	0 °C	0 %	0 dBm	0 Volt		• :	
	cpI03	N/A	N/A	N/A	N/A		•	
	1222	0 °C	0 %	0 dBm	0 Volt		•	
Showing	g 1 to 3 of 3 results					50 pt	r page V Previou	s Next

Step2: Choose your device type, please select dragino NB-IOT device



Step3: Choose to create a new device

STEP 1	STEP 2	STEP 3
Product	Devices	Plan
Datacake product		
You can add devices to an e configuration (fields, dashbo	xisting product on Datacake, or create a new emp bard and more) between devices.	ty product. Products allow you to share the same
Existing product Add devices to an existin	ng product Create a new empty product	t New Product from template Create new product from a template
New Product		
If your device is not available	e as a template, you can start with an empty devic payload decoder in the device's configuration.	ce. You will have to create the device definition (fields,
dashboard) and provide the	1	
dashboard) and provide the Product name		
dashboard) and provide the Product name xxxx		

Step4: Fill in the device ID of your NB device

Add Dragino NB-IoT Dev	ice			>
STEP 1 Product	STEP Devi	2 ces	STEP 3 Plan	
Add Devices You can add one or more Dragi	no NB-IoT devices a	f+IME a time. Devices are ider	ntified by their device IDs.	
DEVICE ID	NAME	LOCATION	TAGS	
「 「 」 Device ID is a required field	12	Location	Add tag	bbA
+ Add another device				
				Back Next

Step5: Please select your device plan according to your needs and complete the creation of the device



Step6: Please add the decoder at the payload decoder of the device configuration.

Decoder location: dragino-end-node-decoder/Datacake-Dragino_NB at main · dragino/dragino-end-node-decoder (github.com)

Due to version update, please use the following decoder for the new version firmware: dragino-end-node-decoder/Datacake-Dragino_NB_New_Version at main · dragino/dragino-end-node-decoder (github.com)

c cn o	DATACAKE Fleet > 1222
LHT52Test	1222
<u>⊷</u> ″ 1 <u>∟~″</u> lgt92	Serial Number Last update 121123123 Never
+ Add Dashboard (3)	Dashboard II History Configuration Debug Rules La Permissions
Reports	General Configuration
And Members	Device name
₿ ⁴ Rules	1222
I Workspace	Icon
Integrations	No icon selected 💌
🛇 White Label	You can override the default product icon for this device
🖄 Billing	Location description
8° Add-Ons	
	Tags
	Add tag Add
	You can use tags to group and inter your devices on dashooarda and in rules
	Metadata



Step7: Add the output of the decoder as a field

+ Add Field Fields Fields describe the data the device will store. Live data LAST UPDATE NAME IDENTIFIER TYPE ROLE CURRENT VALUE Battery BATTERY Float Device Battery 0 Volt 23 days ago : SIGNAL Integer Device Signal 0 dBm 23 days ago Signal SHTTEMP 0 °C 23 days ago : Float Primary Temperature 0% : Humidity SHTHUM Float Secondary 23 days ago N/A 0 23 days ago : Mod MOD Integer 0 23 days ago Adc ADC Integer N/A N/A 0 23 days ago : Interrupt INTERRUPT Integer TEMPDS18820 0 : Tempds18b20 Integer N/A 23 days ago **Configuration Fields** + Add Configuration Field Configuration fields hold a static rice level. They can be accessed in de ue, that can be o and can have a pro FIELD TYPE IDENTIFIER DESCRIPTION VAL (!) No fields have been created, yet Create co nfiguration fields to define configurat

Home - General Configure/Commands to Connect to IoT server for -NB & -NS NB-IoT models

Step8: Customize the dashboard and use fields as parameters of the dashboard







Edit Value Widget	×	
Signal No data		
0		& Public Link + Add Widget
Basics Data Appearance Gauge Timeframe		● Live dat
Field		Signal No data
Signal		0 *
Temperature Humidity		e to the Dashboard!
Mod Adc		is real-time data that is being collected through a Dragino NB-IoT Sensor. This cutting- and Internet of Things (NB-IoT) technology to ensure seamless communication and is
Unit		nonitor environmental conditions.
English + Add Translation		tored:
Cancel	ave	le temperature, it also monitors the moisture levels in the air, known as humidity.

3.4.4 For device have not configured to connect to DataCake

Use AT command for connecting to DataCake

AT+PRO=2,0

AT+SERVADDR=67.207.76.90,4445

3.5 Node-Red (via MQTT)

3.5.1 Configure Node-Red

Take S31-NB UDP protocol as an example.

Dragino provides input flow examples for the sensors.

User can download the required JSON file through Dragino Node-RED input flow template.

Download sample JSON file link: <u>https://www.dropbox.com/sh/mduw85jcuwsua22/</u> <u>AAAvwPhg9z6dLjJhmZjqBf_ma?dl=0</u> We can directly import the template.

The templates for S31-NB and NB95S31B are the same.



Please select the NB95S31B template.
ode-RED		Import nodes						- Dep	oloy 👻
2S	◀□磁							nfig	i
n Î		Clipboard	Paste flow json or	♣ select a file to imp	port				
inject		Local						all flows	
		Examples						LHT65-7	无电容低温
omplete									d that hing
catch								eut.clou	a.meuning
status								LHT65N	
								测试	
nk call								LA66	
t 🗦								nodered	测试
mment	U							LHT65N	数据收集
		Import to curren	nt flow new flow					LTC2	
								litest	
inction	۰ ۵					Cancel	Import	山 中 学 田 学	

	programmer	2023/7/20 14:28	又14:	
> 」 首乐	TSE NB xx	2019/12/3 15:52	文件:	
> 🔜 桌面	出货固件	2023/7/17 11:45	文件:	
> 🏪 Windows (C:)	S31-NB.json	2023/8/9 17:20	JSON	
> 👝 本地磁盘 (D:)				
> → 网络				
V (>	
文件名(N):	S31-NB.json	✓ JSON 文件	~	
L		打开(O) 取消		
link out	G			
Comment				
	Import to	urrent flaur		
✓ function	import to c	Intent now new now		
f function				Cancel Import
× × 0	λ			



Successfully imported template.



Users can set UDP port.

LWL03A LMDS120 L	Edit udp in node	e		¢ config
	Delete	Cancel	Done	
	Properties		• 🖹 🖾	 On all flow
交 获取解析数据	Listen for	udp messages	~	LHT
Get parsed data	🖲 on Port	7999 using ipv4 🗸		eu1
存在则创建存在则存数据	Output	a Buffer	~	LHT
n"t exist, save data if they exist	Name 🗣	7999		测证
新有数据 echarts代码	Tip: Make sur	re your firewall will allow the data in.		LA6
ta for the table	Ports already 1222,1850,20	in use:)02,2999,3999,4999,5999,6363,6999,9999		nod
BAT				LHT
of DSTEMP				lites
f Label				电池
				119
у внт-ним				SH

3.5.2 Simulate Connection

We have completed the configuration of UDP. We can try sending packets to node red.

3.5.3 Configure NB-IoT Sensors

- AT+PRO=3,0 or 3,5 // hex format or json format
- AT+SUBTOPIC=<device name>or User Defined
- AT+PUBTOPIC=<device name>or User Defined
- AT+CLIENT=<device name> or User Defined
- AT+UNAME=<device name> or User Defined
- AT+PWD="Your device token"

3.6 ThingsBoard.Cloud (via MQTT)

3.6.1 Configure ThingsBoard

3.6.1.1 Create Device

Create a New Device in ThingsBoard. Record Device Name which is used for MQTT connection.

Thing								.2
រូ i nin	Add ı	new device				0	×	
me an and bill	1	Device details	device name	Cred Optio	entials	 Owner and gro Optional	oups	
arms shboards	Na	me*						G
lution terr tities	Lal	bel						at devic
Devices Assets	۲	Select existing device profile	Device profile* default	×				
Entity Vie ofiles	0	Create new device profile						
Device pro Asset pro						Next: Criden	tials	
stomers						Cancel	Add	2

3.6.1.2 Create Uplink & Downlink Converter

Uplink Converter

The purpose of the decoder function is to parse the incoming data and metadata to a format that ThingsBoard can consume. device value objects. Nested objects are not supported.

To create an uplink converter go to the Integrations center - > Data converters page and click "plus" button. Name it "MQTT Uplink Converter" and select type "Uplink". Use debug mode for now.

	o Integrations center	> ፟፟፟፟ ឯata converters	C3 🌲 🕃 John Doe 🗄 Tenant administrator
A Home ▲ Alarms ■ Dashboards—	Data converters	Add Data Converter ×	2 + C Q
3 III Solution Enter the nam ♣ Entities ✓ ⓓ Profiles ✓	e for data converter 4 Select <i>Uplink</i> type	Name* MQTT Uplink Converter	Create new converter Create new converter Import converter
Customers Users Integrations center	5 Enable debug mode	Debug mode 6 TBEL Java Script Choose TB	EL function decoder
 ☐ Integrations ① Data converters ↔ Rule chain Costo the Dota 		<pre>function Decoder(psyload, metadata) {</pre>	7 Specify a script to parse and transform data
Edge n Go to the Data to Advanced features Advanced features Nesources Notification center	converters page	<pre>8 // decode payload to 350N 9 var deviceType = 'sensor'; 10 // Result object with device attributes/telemetry data 12 var result = { }</pre>	
☑ Api Usage 7 White Labeling		Test decoder function Cancel Add	8 Add data converter
Settings		Items per pa	ge: 10 ▼ 1-0 of 0 < < > >

Downlink Converter

The Downlink converter transforming outgoing RPC message and then the Integration sends it to external MQTT broke

	🙆 Integrations center	> ‡ Data converters	13 🌲 😍 John Doe
Home Alarms Dashboards 3 Solution Enter the name Entitles Profiles Customers Ousers	Data converters Created time Created time	Add Data Converter Add Data Converter Name* MQTT Downlink Converter Type* Downlink	Create new converter Import converter
 ☐ Integrations center ☐ Integrations ☐ Integrations ☐ Data converters ↔ Rule chain ☆ Edge n Go to the Data converter ☆ Advanced features ➡ Resources ➡ Notification center 	onverters page	TBEL Java Script Choose TE function Encoder(msg.metadata, msgType.integrationMetadata) (Tidy City 1 // Encode downlink data from incoming Rule Engine message City City 2 // msg - JSON message payload downlink message json A A 4 // msgType - type of message, for ex. A A 4 // metadata - list of key-value pairs with additional A 6 // integrationMetadata - list of key-value pairs with additional data defined in Integration executing this converter 7 /** Encoder **/	3EL function encoder 7 Specify a script to parse and transform data
☑ Api Usage 7 White Labeling ✿ Settings		Cancel Add	8 Add data converter age: 10 → 1 - 1 of 1 1

Note:

Our device payload is already human readable data. Therefore, users do not need to write decoders. Simply create by de

3.6.1.3 MQTT Integration Setup

Go to the Integrations center -> Integrations page and click "plus" icon to add a new integration. Name it "MQTT Integration", select type MQTT;

	Integrations center Part Integrations	C3 🌲 😝 John Doe 🗄 Tenant administrator
🔒 Home	Add Integration ×	
🌲 Alarms		2 Click "plus" to create new integration
Dashboards	Created time a Basic settings Uplink data converter Downlink data converter Connection	ally activity status kemote
Entitle Soloot "MOTT" i	Optional	
Profiles	MQTT X	
Customers	tegration name	
e Users	WQTTIRtegration	
🙆 Integrations center 🛛 🔺	Construction	
☐ Integrations	Allow create devices or assets	
다. Data converters		
↔ Rule chains	Navigate to the "Integrations" page	
👚 Edge management 🛛 🗸		
🛠 Advanced features 🛛 🗸		
🖿 Resources 🛛 🗸 🗸		
Notification center		
🖪 Api Usage		
P White Labeling	Next	5 Click "Next"
🏟 Settings	ilems per page	10 - 1-0 of 0 < < > >

• The next steps is to add the recently created uplink and downlink converters;

Add a topic filter:

Consistent with the theme of the node setting.

You can also select an MQTT QoS level. We use MQTT QoS level 0 (At most once) by default;

	🙆 Integrations	center > 🛨 Integrations		C3 🌲 😝 John Doe Tenant administrator
A Home ▲ Alarms	Integrations	Add Integration	×	+ C Q
Dashboards	Created time	Basic settings Uplink data converter	Downlink data converter Connection	y activity Status Remote
Entities	10 Specify <i>Host</i>	Host* broker.hivema.com	Optional Port* 1883	11 Specify <i>Port</i>
🖆 Profiles 🗸 🗸		Credentials		
Users Integrations center		Credentials type* Anonymous	•	
		Enable SSL		
다. Data converters ↔ Rule chains	12 .dd a <i>Topic</i> filter	Topic Qos	At most anos	3) u can also select an MQTT QoS level
		Single [+] and multi-level [#] wildcards supported.	At most once	
Resources V		[+] is suitable for any topic filter level. Ex.: v1/devices/+// [#] can replace the topic filter itself and must be the last		
Notification center		Add topic		
₽ White Labeling		Back	Check connection Add	
Constantings			items per page	

3.6.2 Simulate with MQTT.fx

Profile Name	onenet_mqtt_new	
Profile Type	MQTT Broker	MQT
MQ11 Broker Profile Settings		
Broker Address	broker.hivemq.com	
Broker Port	1883	
Client ID	df6d5832c6d44f0c9689b0f531f1cd4d	Generate
User Name	936c0db6-e9a59fdb-3f63c8bfce	
Password	•••••	

а ×

@ MQTT.fx - 1.7.1	- 0	×
File Extras Help		
onenet_matt_new • 🔅 Connect Di	sconnect	•••
Publish Subscribe Scripts Broker Status Log		
tb/mqtt-integration-tutorial/sensors/Adevice/temperature Subscribe	QoS0 QoS1 QoS2 Autoscrol	0 57
tb/mqtt-integration-tutorial/sensors/Adevice/temperature	tb/mqtt-integration-tutorial/sensors/Adevice/temperature	1 QoS 0
Topics Collector (0) Scan Step Og v	th/matt-integration-tutorial/concorg/Adaptice/temporature	
	to/ mqtt-integration-tutonali sensors/ Auevice/ temperature	1
	28-07-202314:5200.33520205 {"temperature":130.0,"humidity":0.0,"battery":3.26,"signal":25}	QoS 0
	Payload decoded by Plain Text Decoder	, 😲

3.6.3 Configure NB-IoT Sensor

AT Commands

- AT+PRO=3,3 // Use MQTT to connect to ThingsBoard. Payload Type set to 3.
- AT+SUBTOPIC=<device name>
- AT+PUBTOPIC=<device name>
- AT+CLIENT=<device name> or User Defined
- AT+UNAME=<device name> or User Defined
- AT+PWD=<device name> or User Defined

Test Uplink by click the button for 1 second

• Dev	De Dev	vice A							? ×
4	<	Details	Attributes	Latest telemetry	Ala	irms	Events	Relation	s di >
5:32:5 5:01:04	La	itest tele	emetry						Q
		Last upd	late time	Кеу 个		Value			
		2023-07-	20 17:21:10	humidity		80			
		2023-07-	20 17:21:10	rawData		{"tempera	ture":130.0,"h	umidity":0.0,"b	attery
		2023-07-	20 17:21:10	temperature		42			
				Items per page: 10	•	1 - 3 0	of 3	< <	> >1

3.7 ThingsBoard.Cloud (via COAP)

3.7.1 Configure ThingsBoard

3.7.1.1 Create Uplink & Downlink Converter

Uplink Converter

The purpose of the decoder function is to parse the incoming data and metadata to a format that ThingsBoard can consume. device value objects. Nested objects are not supported.

To create an uplink converter go to the Integrations center -

> Data converters page and click "plus" button. Name it "COAP Uplink Converter" and select type "Uplink". Use debug mode for now.

ThingsBoard					ription ThingsBoard Cloud Maker C	S Fyk Tenant administrator
A Home ➡ Plan and billing	Data con	werters			Create new converter	+ C Q
🛆 Alarms		Created time 🔱	Name			
E Dashboards		2024-07-29 10:53:34	coac-down		Import converter	Select Create new converter
Solution templates				Name'		1.4
🝰 Entities 🗸 🗸		2024-07-29 10:53:25	coap-up	COAP Uplink Converter	•	× •
🏚 Profiles 🗸 🗸				Tipe* Tellak - 4 Select uplink type		
21. Customers				орлах		
O Users				Debug mode Enable debug mode		
Integrations center A				TBEL JavaScript 6 Choose TBEL function decoder		
Integrations				unction Decoder(payload, metadata) (Tidy 🤀 🕐 😳		
U Data converters	Go to the I	Data converters page		2 // payload - array of bytes 3 // metadata - key/value object		
↔ Rule chains				4 5 /** Decoder **/	data	
Advanced features				6 Specify a script to parse and transform 7 // decode payload to string 8 upp emiladifie - decodeTectnics/emiland).	uata	
Resources				9 10 // decode payload to 350N		
Notification center				<pre>13 // use data = decodeTelecolosulose(); }</pre>		
API usage				Test decoder function		
T White labeling				Update only keys list		
Settings				manufacturer ×		
😵 Security 🗸 🗸				The values associated with the provided keys will be saved to the database only if they are different from the corresponding values in the previous converted message. This		
				functionality applies to both attributes and telemetry in the converter output.		
				Description		
				Add data converter		
					tems per page: 10 v 1 - 2 of 2	16 C > >1

Downlink Converter

The Downlink converter transforming outgoing RPC message and then the Integration sends it to external COAP broker.

ThingsBoard	🖻 Integrat	tions center 👌 🏷 Data converters		Current subscriptor (- ThingsBoard Cloved Make Strain - <mark>Bill Londo contra Long Scie</mark>	E A O Fyk Tenant administrator
A Home	1.00				
Plan and billing	Data con	verters			+ C Q
🛆 Alarms		Created time \downarrow	Name	Туре	Create new converter
E Dashboards		2024-07-29 10:53:34	coap-down	Add data converter 2 X	-
III Solution templates					1 Import converter
👍 Entities 🗸 🗸		2024-07-29 10:53:25	coap-up	None: S Enter the name for data converter	
🏚 Profiles 🗸 🗸				COAP Downlink Converter	Select create new
21 Customers				Type: A Select Downlink type	converter
e Users					
Integrations center				Enable debug mode	
Integrations				TBEL JavaScript 0 Choose TBEL function encoder	
Q. Data converters		Go to the Data converte	rs page	Innction Encoder(mag, metadata, mag1ype, Tidy # ⑦ 🖸	
↔ Rule chains				1 // Encode downlink data from incoming Rule Engine message	
Edge management V				2 3 // msg - JSON message payload downlink message json	
🛠 Advanced features 🗸 🗸				4 // mgruppe - type of message, for ex. "ATTRIBUTES_UPDATED", 'POST_TELEMETRY_REQUEST 7 Specify a script to parse and tansform	data
Resources V				5 // metadata - list of key-value pairs with additional data about the message	_
Notification center				6 // integrationVetadata - list of key-value pairs with additional data defined in Integration	
API usage					
White labeling				Test encoder function	
Settings				Description	
😵 Security 🗸 🗸					
				Num ar ave 10	× 1-24/2 ((()))
				items per page.	

3.7.1.2 COAP Integration Setup

Go to the Integrations center -> Integrations page and click "plus" icon to add a new integration. Name it "CoAP Integration", select type COAP ;

	🖻 Integrations center 👌 🔁 Integrat	ions				Current subscription ThingsBoard Cloud Maker Status (Titial ends on the Aug 28, 202	😗 🗅 🌲 😝 Fyk Tenant administrator 🗄
A Home							
Plan and billing	Integrations						+ C Q
🛆 Alarms	🗌 Created time 🕁	Name	Туре			Daily activity	
55 Dashboards		CoAB internation	_				
Solution templates		Corr Integration	Add integration		💿 × 📄		inter integration
🝰 Entities 🗸 🗸							
🏚 Profiles 🗸 🗸			0		0		
2 Customers			Basic settings	Uplink data converter	Connection		
😝 Users			Integration type* CoAP		× 🖪	Select "COAP" integration type	
Integrations center							
Integrations	Navigate to the		CoAP integration		4	Enter integration name	
Data converters	"Integrations" page		Enable internation				
↔ Rule chains			Debug mode				
😤 Edge management 🗸 🗸			Allow create devices or assets				
🛠 Advanced features 🗸 🗸							
🖿 Resources 🗸 🗸							
Notification center							
🖪 API usage							
T White labeling							
Settings							
Security							
					Next	5 Click "Next"	
						items per page: 10	▼ 1-1of1 < < > >

The next steps is to add the recently created uplink converters;

ThingsBoard	ä	🖻 Integrations center 👌 🔁 I	Integrations	Current subactionian (TheingsBanet Cloud Statu (Maker C	٠	B Fyk Tenant	administrator	
		Integrations					+	୯ ୯	
		Created time 🚽	Name	Type Daily activity	State	15	Remote		
5 Dashboards		2024-07-29 10:55:11	CoAP integration		k	tive	0	0 1	
III Solution templates				Add integration V X					
	×			0 0					
n Profiles	×			Basic settings Uplink data converter Connection					
				CoAP					
e Users				Uplink data converter Create new Select existing Select the previously created					
Integrations center	^			uplink data converter					
	-			coap-up X					
Data converters	_	At this s	step, you can either						
↔ Rule chains		data co	inverter or create a						
"	Ľ	one din	ectly in this window						
Advanced features	Ľ								
Resources	Ľ								
Notification center									
Ta Mhite labellan	_								
Cetting									
A Security									
(becan)									
				Back					
				items per page:	10 👻 1	- 1 of 1			

3.7.1.3 Add COAP Integration

F ThingsBoa	rd 🖻 Integrations center 🔸 🗗 Integrations		Currier subacroston ("ThingsBarrier Cloud Multer") Status (Enderschatzubys 2019201) C: A 😧 Frik Tenune administrator
A Home			
Plan and billing	Integrations		+ C Q
🛆 Alarms	🗌 Created time 🕁 🛛 Name	Туре	Daily activity Status Remote
E Dashboards	2024-07-29 10:55:11 CoAP Integration		Active 🛛 🗃 👔
E Solution templates		Add integration	×
👍 Entities	×	0 0 0	
n Profiles	×	Basic settings Uplink data converter Conne	ction
21 Customers		CoAP	
O Users		Security mode*	default setting
Integrations center	*	NU SECORE	
Integrations	CoAP Base Address	Base URL Path coap://int.thingsboard.cloud /	No configuration required
Data converters			
↔ Rule chains	CoAB and point LIPI	CoAP entpoint URL coap://int.thingsboard.cloud/i/47f25030-ad1b-f153-b983-8553e8bd2519	0
Edge management	COAP enupoint OKL		
* Advanced features	(URLs configured in the	Execute remotely	·
Resources	node need to be consistent)	Advanced setting	
Notification center	,		
API usage			
T White labeling			
Settings			
Security	×		
		Back	Mail Add completed
			hemo per page: 10 👻 1 - 1 of 1 I < < > > I

3.7.2 Node Configuration(Example: Connecting to the Thingsboard platform)

3.7.2.1 Instruction Description

- AT+PRO=1,0(HEX format uplink) &AT+PRO=1,5(JSON format uplink)
- AT+SERVADDR=COAP Server Address,5683

Example: AT+SERVADDR=int.thingsboard.cloud,5683(The address is automatically generated when the COAP integration is created)

🗖 Serial Port Utility - Personal Edition			-	- 🗆	×
<u>File Edit View Tools Control H</u> elp					
🖹 🚥 🕨 🚺 🔳 🗘 + − 🛅 🎲					
Serial Port Setting	AT+CFGMOD=1				-
Port COM7(Silicon Labs CP210x USB 💌	AT+DELII=862406079	162513			
Baudrate 9600 🔹	AT+PWORD=378e03	102010			
Data Bits 8	AT+SERVADDR=int.th (54.237.160.141,5683)	ingsboard.cloud,5683			
Parity None 💌		, 	J		
Stop Bits 1	AT+CLIENT=NULL AT+UNAMF=NULI				
Flow Type None 🔹	AT+PWD=NULL				
<pre>Receive Setting </pre> Text ○ Hex Auto Feed Line	AT+PUBTOPIC=NULL AT+SUBTOPIC=NULL AT+TDC=7200 AT+INTMOD=0 AT+APN=NULL				
☑ Display Send	AT+5VT=0				
	AT+PRO=1,5				
Display Time	AI+RXDL=0				•
Send Setting	AT+CFG				and
• Text C Hex					
□ Loop 1000 ÷ ms					
COM7 OPENED, 9600, 8, NONE, 1, OFF Rx: 894 Bytes	Tx: 46 B	ytes			1

Note: The port for the COAP protocol has been fixed to 5683

• AT+URL1=11, character length, "Needs to be consistent with the CoAP endpoint URL in the platform"

If the module used is **BC660K**, only one URL directive needs to be configured,

e.g.

• AT+URL1=11,38, "i/faaaa241f-af4a-b780-4468-c671bb574858"

) 🔲 Serial Port Utility - Personal Edition		_		×
<u>File Edit View Tools Control H</u> elp				
🖹 ∞ 🕨 🔳 O + - 🛅 🕸				
Serial Port Setting				•
Port COM7(Silicon Labs CP210x USB 🗸	AT+SLEEP=0			
Baudrate 9600 💌	AT+MQOS=2 AT+IPTVPE=1			
Data Bits 8	AT+URI1=11,38,"i/faaa241f-af4a-b780-4468-c671bb574858"			
Parity None	AT+URI2=NULL			
Stop Bits 1	AT+URI4=NULL AT+URI4=NULL			
e Elas Tura Nara	AT+URI5=NULL			
Flow Type None	AT+URI6=NULL			
Receive Setting	AT+URI8=NULL			
Text C Hex				
Auto Feed Line	AT+GNSST=30			
5 F Display Sand	AT+GTDC=24			
	AT+CLOCKLOG=1,65535,15,8			
				-
Send Setting	AT+CFG		Sor	
				iu
6 □ Loop 1000 ÷ ms	AT+CFG			•
COM7 OPENED, 9600, 8, NONE, 1, OFF Rx: 889 Bytes	Tx: 7 Bytes			

If you are using a BG95-M2 module, you need to configure TWO URL commands,

e.g.

- AT+URL1=11, "i";
 AT+URL2=11,"/faaaa241f-af4a-b780-4468-c671bb574858"

Serial Port Utility - Personal Edition		-		×
<u>F</u> ile <u>E</u> dit <u>V</u> iew <u>T</u> ools <u>C</u> ontrol <u>H</u> elp				
] Ē ∞ ▶ ■ ♀ + ─ Ē ‡				
Serial Port Setting AT+GDNS=0 Port COM7(Silicon Labs CP210x USB • AT+GDNS=0 Baudrate 9600 AT+SLEEP=0 Data Bits 8 AT+URI=11, 'i" Parity None AT+URI=11, 'i" Stop Bits 1 AT+URI=211, 'faaa241f-af4a Flow Type None AT+URI3=NULL Receive Setting AT+URI3=NULL AT+URI3=NULL AT+URI3=NULL AT+URI3=NULL AT+URI3=NULL AT+URI3=NULL AT+URIS=NULL AT+URIS=NULL AT+URIS=NULL AT+GINSST=30 AT+GNSST=30 AT+GDC=24 AT+CLOCKLOG=1,65535,15	э-b780-4468-c671bb574858" 5,8			×
Send Setting AT+CFG © Text C Hex			Ser	nd
□ Loop 1000 ÷ ms AT+CFG				•
COM7 OPENED, 9600, 8, NONE, 1, OFF Rx: 886 Bytes Tx: 7 Bytes				

3.8 Tago.io (via MQTT)

3.8.1 Create device & Get Credentials

We use MQTT Connection to send data to Tago.io. We need to Create Device and Get MQTT Credentials first.

	Ū I	a state of the second	lion			Authorization	
	₽	Browse through r	etworks & c	connectors and create your device. <u>Learn more</u>			
Sta Sei	art arch			En	dless possibilities	6 6	
My	y conr	lectors		Gra	ate a connector to integrate with		1
8				any	sensor using any protocol	<u>o</u>	
es Ne	etwor	ks		Lear	rn more →		
۶ <u>م</u>	Sin	nulator					
n av	NS AV	/S loT	- 11		0 0 0		
≡ + ¢	2 Bel	Where	- 1	search a connector for	your device	All networks	
g	Ce	llio		Recently added			_
€	⇒ Ge	neric Endpoint					
нт	тр НТ	TPS		A			
	< Kir	iéis			-		
	2 10	κν		НТТР		2	
	N	NA		Custom HTTPS	Custom MQTT	wine the MOTT	
A	👌 Loi	RaWAN Actility		protocol directly to send/get data	protocol to send/get	data	1
0.	🕉 Lol	RaWAN ChirpStack					
	Lol	RaWAN CityKinect					
		RaWAN CityKinect	MQTT:	: The Standard for IoT Messa	aging		
ails		RaWAN CityKinect	MQTT:	: The Standard for IoT Messa Custom MQTT	aging		
AIIS a name for this network here.	s device	e and learn about	MQTT:	: The Standard for IoT Messa Custom MQTT ce name	Imaging Image: Data storage type Image: Device Data Optimiz	red (Immutable)	
AIIS a name for this etwork here. e the type of b for this device.	Lol	e and learn about to be used to store	MQTT:	: The Standard for IoT Messa Custom MQTT :e name	aging Data storage type Device Data Optimiz	ted (Immutable)	
Ails a name for this e the type of b for this device. A Retention	Lol	e and learn about to be used to store	MQTT: Devic nbmatt O Period	: The Standard for IoT Messa Custom MQTT :: test	Data storage type Device Data Optimiz Device Data Optimiz	zed (Immutable) 🗸	
ils a name for this etwork here. a the type of b or this device. A Retention ata Retention in ves old data first d you define here.	Colored Colore	e and learn about to be used to store e automatically bucket after the arn more.	MQTT: Devic nbmatt O Period Select a	Custom MQTT Custom MQTT	Data storage type Data corage type Device Data Optimiz O Retention	zed (Immutable)	
Ails a name for this etwork here. e the type of b for this device. A Retention Data Retention on ves old data fro d you define here n informati	s device s devicet	e and learn about to be used to store e automatically bucket after the arn more.	MQTT: Devic Devic nbmatt O Period Select of Payload T	Custom MQTT Custom MQTT	Data storage type Device Data Optimiz Retention	zed (Immutable)	

Go to the Device section and create a device. Then, go to the section tokens and copy your device-token.

The device needs to enable the TLS mode and set theAT+TLSMOD=1,0 command.

On the Connection Profile window, set the following information:

- Profile Name: "Any name"
- Broker Address: mqtt.tago.io
- Broker Port: 8883
- Client ID: "Any value"

On the section User credentials, set the following information:

- User Name: "Any value" // Tago validates your user by the token only
- Password: "Your device token"
- PUBTOPIC: "Any value"
- SUBTOPIC: "Any value"

AT command:

- AT+PRO=3,0 or 3,5 // hex format or json format
- AT+SUBTOPIC=<device name>or User Defined
- AT+PUBTOPIC=<device name>or User Defined
- AT+CLIENT=<device name> or User Defined
- AT+UNAME=<device name> or User Defined
- AT+PWD="Your device token"

3.8.2 Simulate with MQTT.fx

Edit Connection Profiles		-			×
Тадо	Connection Profile				
	Profile Name Tago				
	Broker Address mqtt.tago.lo				
	Broker Port 8883				
	Client ID tutorial	Generate			
	General User Credentials SSL/TLS Proxy Last Will and Testament				
	Enable SSL/TLS 🗸 Protocol TLSv1.2		•		
	 CA signed server certificate CA certificate file CA certificate keystore Self signed certificates Self signed certificates in keystores 				
+ -	Revert	Cancel	ОК	Ар	ply

MQTLfx: 1.7.3 -									
ref Extras Help Publish Subscribe Scripts Broker Status Log pub Status pub Status Dump Messages Mate Subscribe pub Dump Messages pub Based on the Status pub Status pub Status pub Status pub Based on the Status pub Status pub Status pub Status pub Status pub Status Status Status pub Status Status Status Status Status Status Status pub Status Status Status <td>I MQT</td> <td>T.fx - 1.7.1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td> ;</td> <td>×</td>	I MQT	T.fx - 1.7.1						;	×
Topics Collector (0) Son NV () pub 000000000000000000000000000000000000	File E	Extras Help							
Publish Subscribe Scripts Broker Status Log pub			*	Connect	Disconnect			•	C
pub © Suborb © Suborb © Suborb © Suborb © Collector (0) © Collector (0) </td <td>Publis</td> <td>sh Subscribe</td> <td>Scripts Broker Status</td> <td>Log</td> <td></td> <td></td> <td></td> <td></td> <td></td>	Publis	sh Subscribe	Scripts Broker Status	Log					
pub pb 0000 Dump Messages Mute Unmaturation 0000 pb 00000 0000 0000 0000 0000 0000 0000 00000 00000 00000 00000 00000 00000 00000 00000 00000 000000 000000 000000 000000 000000 000000 000000 0000000 0000000 0000000 00000000 00000000 00000000 00000000 0000000000 00000000000 000000000000000000000000000000000000	pub		•	Subscribe			QoS 0 QoS 1 QoS 2	Autoscroll	•
Dump Messages Mate Generation Control	pub			•	2 pub			005	1
Topics Collector (0) Scen Stop QF pub 08-08-2023 10:52:12.99132599 00:00 00:00 f86520705346276200640cbc190100000000140514000064d1adce QF 25 pub QF 25 Scene Payload decoded by Plain Text Decoder			Dump Messages	Mute Unsubscri	pub			Qos	2
Topics Collector (0) Son Stop Qt pub 08-08-2023 10:52:12.39132599 Qccoll Qccoll f86620705346276200640cbc199100000000140514000064411adce Qccoll Qccoll Qccoll pub Cocoll Cocoll Qccoll									
Topics Collector (0) Scan Scap Q2 pub 08-08-2023 10-52-12.99132559 00600 f86520705346276200640cbc19010000000140514000064d1adce Q2 pub 02-02-2023 10-52-12.99132559 00600 f86520705346276200640cbc19010000000140514000064d1adce Q2 pub Q2 Q2 f86520705346276200640cbc190100000000140514000064d1adce Q2 payload decoded by Plain Text Decoder									
Topics Collector (0) Son Stop QC pub 08-08-2023 10:52:12:39132599 QOS 00 186620705346276200640cbc199100000000140514000064d1adce QC 25 199 25 25 100 25 25 100 100 100									
Topics Collector (0) Scin Stop Q pub 08-08-2023 10:52:12.39132599 Qos Co f8652070533452767200640cbc190100000000140514000064d1adce Image: Collector (0) Image: Collector (0) pub Collector (0) Scin									
pub 2 08-08-2023 10:52:12:99132599 Coose f86620705346276208640cbc190100000000140514000064d1adce 2.5 Payload decoded by Plain Text Decoder	Topics Col	llector (0)		Scan Stop 0	•				
08-08-2023 10:52:12:39132599 0000 186620705346276200640:b:19010000000140514000064d1adce					pub				2
f86620705346276200640cbc190100000000140514000064d1adce 25 Payload decoded by Plain Text Decoder					08-08-	-2023 10:52:12.39132599		Qos	30
25 +5/a Payload decoded by Plain Text Decoder					f8662	20705346276200640cbc190100000000140514000064d1adce		-	
25 + t/A 05 Payload decoded by Plain Text Decoder									
Payload decoded by Plain Text Decoder								2.5 • K	5 /s
							Payload decoded by Plain Tex	t Decoder	15

Users can run the AT+PRO=3,5 command, and the payload will be converted to JSON format.

	MQTT.fx - 1.7.1				- 🗆 🗙
	ile Extras Help				
	onenet_mqtt_new	- 🔅 Conne	Disconnect	t	-
	Publish Subscribe	Scripts Broker Status Log			
	pub	▼ Subscrib		Qo50 Qo51 Qo52	Autoscroll 06-
р	ıb	Down Managers - Adults -	1 pub		QoS C
То	pics Collector (0)	Scan Stop	Q.v.		
			pub		1
			08-08	18-2023 10:50:02.39002750	QoS
			{"IME	HET :866207053462762, "Temperature :130.0," humidity":0.0,"battery":3.27,"signal:26}	i
				Payload decoded by Plain Text	: Decoder

3.8.3 tago data

	~~										
A Home			Devices								
		T	Name \$	Last Input \$	Connector	Network	Active 🗢 Tyj				
Pevices	Buckets	Filer	search		search	search	~				
	Duckets	(mes	nbmqtt_test	a minute ago	Custom MQTT	MQTT	• Yes De				
Analysis	7 Actions	Cores	It22222-I	3 months ago	Custom TTI / TTN	LoRaWAN TTI/TTN v3	• Yes De				
Access	Users	🖋 Run	lsn50_temp	5 months ago	Custom TTI / TTN	LoRaWAN TTI/TTN v3	● Yes De				
SHBOAR	DS	Q. ∐2 ☷ +	LSLP01	8 months ago	Custom TTI / TTN	LoRaWAN TTI/TTN v3	• Yes De				

Device #1 Last lepst 5 minute	age Last Output B	Never Bucket Device #1							A	tive 🖌 🗖
General Information	Emulator	Payload Parser	Uve Inspector	Configuration Parameters	Tags	More				
Q. Live Inspector With Live Inspector, you ca	Q. Live Inspector With Live Inspector, you can check all connections of this device with TagoIO. It's only visible while you're visiting this page.									
search						25 50	100 500	*	\otimes	
<pre>15:45:57: [MQTT] Device connected "Token Ending: 59669 Client-ID: 123124123 Will-Message: false" 15:45:58: [MQTT] Device publish { "topic": "temperature", "payload": "21", "qos": 0 } 15:45:59: [MQTT] Device publish { "topic": "temperature", "payload": "21", "qos": 0 } 15:46:04: [MQTT] Device disconnected "socket event: disconnect"</pre>										

3.9 TCP Connection

AT command:

- AT+PRO=4,0 // Set to use TCP protocol to uplink(HEX format)
- AT+PRO=4,1 // Set to use TCP protocol to uplink(JSON format)
- AT+SERVADDR=120.24.4.116,5600 // to set TCP server address and port

Sensor Console Output when Uplink:

g 🕂 —	🕨 🖬 📓 🍾 📻 🌣
	DRHPIND 231-NR WR-IDT LEMBELATOLE & HOMIDITO SEUROLMANDAT
	Image Version: v1.0.0
.(COM3) 🔻	NB-IoT Stack : D-BC660K-001
_	Protocol in Used: TCP
•	[7721]NBIOT has responded.
•	[12052]Echo mode turned off successfully.
	[13398]Disable the reporting of deep sleep event URC.
•	[14757]Model information:BC660K-GL.
•	[16097]The IMEI number is:866207053462762.
	[17445]The IMSI number is:460083823106206.
•	[19493]Set the data format for sending and receiving.
	Currently set frequency band: 1,2,3,4,5,8,12,13,17,18,19,20,25,28,66,70,85
	[26535]Signal Strength:22
	[31569]PSM mode configured
/ Hex	[34202]DNS configuration is successful
	[40246]No DNS resolution required
	[41284]*****Upload start:0*****
	[41319]remaining battery =3262 mv
	[42116]DS18B20(1) temp is -0.06
	[42219]adc_mV(1):18.00
	[42346]Humidity =0.00 %rh
) Hex	[42375]tem =130.00 C
- nr	[43915]Open a Socket Service successfully
· · · · · · · · · · · · · · · · · · ·	[45964]Upload data successfully
	[50504]Close the port successfully
	[51543]Send complete
	[52567]*****End of upload*****

See result in TCP Server:

🔚 120.24.4.116 - SecureCRT	_	\times
文件(F) 编辑(E) 查看(V) 选项(Q) 传输(T) 脚本(S) 工具(L) 帮助(H)		
🏭 疑 🖓 🖏 🗈 🛍 🗛 🧏 🥵 🍠 I 🖀 🛞 I 🞯 I 🔤 💂		
120.24.4.116		×

```
Received b'r@1`tW\x00n\x0c\xe2\x1d\x01\x00\xdc\x00\x0c\xe1\x00\xe1\x01\x8d' from
('223.104.255.116', 30606).
Reply:b'r@1`tW\x00n\x0c\xe2\x1d\x01\x00\xdc\x00\x0c\xe1\x00\xe1\x01\x8d'
^CTraceback (most recent call last):
    File "tcp_server.py", line 14, in <module>
        buf = sock.recv(1024)
KeyboardInterrupt
root@iZwz9gilgOpbfmlww6nvamz:~/python#
```

3.10 AWS Connection

Users can refer to Dragino NB device connection to AWS platform instructions

4. MQTT/UDP/TCP downlink

4.1 MQTT (via MQTT.fx)

Configure MQTT connections properly and send downlink commands to configure nodes through the Publish function of MQTT.fx.

1. Configure node MQTT connection (via MQTT.fx):

AT command:

- AT+PRO=3,0 or 3,5 // hex format or json format
- AT+SUBTOPIC=User Defined
- AT+PUBTOPIC=User Defined
- AT+UNAME=<device name> or User Defined
- AT+PWD=<device name> or User Defined
- AT+SERVADDR=8.217.91.207,1883 // to set MQTT server address and port

Note: To uplink and downlink via MQTT.fx, we need set the publish topic and subscribe topic different, for example: AT+SUBTOPIC=SE01_SUB & AT+PUBTOPIC=SE01_PUB.

r			
Serial Port Utility - Personal Edition	n –		Edit Connection Prot
<u>File Edit View Tools Control</u>	<u>H</u> elp		M2M Eclipse
			Tago.io
			ThingsBoard
Serial Port Setting —	[[KX][10:01:04.254] C		normal mqtt
Dont COMO (USE =	[[IX][10:01:04.964] AT+CFG		
	[[RX][18:01:05.064] AT+MODEL=SE01-ND-GE VI.2.1		
Baudrate 9600 💌	[[KX][18:01:05.064] AT+CF0M0D=1		
	[[KX][18:01:05.004] AT+DEUI=800207052559857		
Data Bits 8	[[RX][18:01:05.134] AT+PWORD=51/TII		
Parity None 🔻	[RX][18:01:05.134] AT+SERVADDK=NULL		
	[RX][18:01:05.134]		
Stop Bits 1	[RX][18:01:05.134] AT+ULIENT=NULL		
Flow Type None 🔻	[RX][18:01:05.134] AT+UNAME=NULL		
	[RX][18:01:05.204] AT+PWD=NULL		
Receive Setting	[RX][18:01:05.204] AT+PUBTOPIC=NULL		
	[RX][18:01:05.204] AT+SUBTOPIC=NULL		
• Text C Hex	[[RX][18:01:05.204] AT+TDC=7200		
- Auto Feed Line	[[RX][18:01:05.264] AT+INIMOD=0		
Auto reeu Line	[[RX][18:01:05.264] AT+APN=NULL	1	
🔽 Display Send	RX 18:01:05.264 AI+5VI=0		
🔽 Display Time	[RX][18:01:05.264] AT+PRO=3,0		
	[[KX][18:01:05.264] AT+CFM=0		
Send Setting	[RX][18:01:05.264] AT+RXDL=0	•	
C Taut C Hau	AT+CFG		
• Text • Hex		Send	
□ Loop 1000 + ms			
□ Line by Line	AT+CFG	•	
			+ -
COM9 OPENED, 9600, 8, NONE,	1, OFF Rx: 3,665 Bytes Tx: 153 Bytes		0.

2. When the node uplink packets, we can observe the data in MQTT.fx.

3. The downlink command can be successfully sent only when the downlink port is open.

The downlink port is opened for about 3 seconds after uplink packets are sent.

Therefore, when we see the node uplink packets in the **Subscribe** window, we need to immediately switch to the **publish** window to publish the **hex format** command.

😳 MQTT.fx - 1.7.1		- O X
File Extras Help		
normal mqtt	Connect Disconnect	₽ ●
Publish Subscribe Scripts	Broker Status Log	
> SEO1_SUB	Publish	Qo Qo Qo Retained 😋
01 00 00 2E		

WQTT.fx - 1.7.1		-	×	plink payload format: × + - U ×	SecureCRI DRAGINOU 7
File Extras Help				옥 숲 특 한 (오 : "")	9.0 (Flogol(1))
node-red	Connect Disconnect		🚽 🔴	oio rg	
Publish Subscribe Scripts Brok	ker Status Log				- 0
» SE01_SUB	▼ Publish	QoS0 QoS1 QoS2 Re	etained or	— (m) @	
01 00 00 2E					
				80408]Exit sleep mode 87006[Signal Strength:14 89970]******Upload start:5**** 99007]remaining battery =3310 mp 93155[water_sol1:0.00 93207]conduct_sol1:0.0 94323]sol1electric_constant:0.0 998000]pened the WOTT Client network successfully 03959[Successfully connected to the server 04956]Ibload data successfully 10475]Received downlike data <u>10 10 00 28</u> 100522]Subscribe to topic successfully 10525]Subscribe to topic successfully 10525]Subscribe to topic successfully 11510]Send complete 11515]******End of upload***** 24463]Enter sleep mode **GETSENSORVALUE=1	Send
				+GETSENSORVALUE=1	
				F Rx: 5,630 Bytes Tx: 187 Bytes	

Note: Users can edit the hex command in advance. When the node uplink, directly click the publish button several times to increase the success rate of command configuration.

5. FAQ

5.1 What is the usage of Multi Sampling and One Uplink?

The NB series has the feature for Multi Sampling and one uplink. See one of them

http://wiki.dragino.com/xwiki/bin/view/Main/User%20Manual%20for%20LoRaWAN%20End%20Nodes/SN50v3-NB_BN-IoT_Sensor_Node_User_Manual/#H2.5Multi-SamplingsandOneuplink

User can use this feature for below purpose:

- 1. **Reduce power consumption**. The NB-IoT transmit power is much more higher than the sensor sampling power. To save battery life, we can sampling often and send in one uplink.
- 2. Give more sampling data points.
- 3. Increase reliable in transmission. For example. If user set
 - AT+TR=1800 // The unit is seconds, and the default is to record data once every 1800 seconds (30 minutes, the minimum can be set to 180 seconds)
 - AT+NOUD=24 // The device uploads 24 sets of recorded data by default. Up to 32 sets of record data can be uploaded.
 - AT+TDC=7200 // Uplink every 2 hours.
 - this will mean each uplink will actually include the 6 uplink data (24 set data which cover 12 hours). So if device doesn't lost 6 continue data. There will not data lost.

5.2 Why the uplink JSON format is not standard?

The json format in uplink packet is not standard Json format. Below is the example. This is to make the payload as short as possible, due to NB-IoT transmit limition, a standard Json is not able to include 32 sets of sensors data with timestamp.

The firmware version released after 2024, Mar will use change back to use Json format. Detail please check changelog.

1	{
2	"IMEI": "8(3",
3	"Model": "D23-NB",
4	"temperature1": -18.6,
5	"temperature2": -409.5,
6	"temperature3": -409.5,
7	"battery": 3.33,
8	"signal": 28,
9	"1": {
10	-18.1,
11	-409.5,
12	-409.5,
13	2024/02/28 09: 01: 38
14	},
15	"2": {
16	-17.8,
17	-409.5,
18	-409.5,
19	2024/02/28 07: 51: 18
20	},

6. Trouble Shooting:

6.1 Checklist for debuging Network Connection issue. Signal Strenght:99 issue.

There are many different providers provide NB-IoT service in the world. They might use different band, different APN & different operator configuration. Which makes connection to NB-IoT network is complicate.

If end device successfully attached NB-IoT Network, User can normally see the signal strengh as below (between 0~31)

g 🕂		
		UKHSINU SATENK NKETUT TPMOPPATUPP & HUMUTTU SPUSUPMANJAT
		Imana Harcian - u1 8 8
(COM3)	-	
	-	Protocol in Used: ICP
		[7721]NBIOT has responded.
	-	[12052]Echo mode turned off successfully.
		[13398]Disable the reporting of deep sleep event URC.
	-	[14757]Model information:BC668K-GL
		[1487]The IMEL number ic 96629762
	-	
		[1/445]The IMSI number 15:460083823106206.
	-	[19493]Set the data format for sending and receiving.
		Currently set frequency band: 1,2,3,4,5,8,12,13,17,18,19,20,25,28,66,70,85
		[26535]Signal Strength:22
		31569 PSM mode configured
) Hex		[34202]DNS configuration is successful
		[40246]No DNS resolution required

If fail to attach network, it will shows signal 99. as below:

[37666]Signal Strength:99

When see this issue, below are the checklist:

- Does your SIM card support NB-IoT network? If SIM card doesn't not specify support NB-IoT clearly, normally it doesn't support. You need to confirm with your operator.
- Do you configure the correct APN? Check here for APN settings.
- Do you lock the frequency band? This is the most case we see. Explain and Instruction.
- Check if the device is attached to Carrier network but reject. (need to check with operator).
- · Check if the antenna is connected firmly.

If you have check all above and still fail. please send console log files (as many as possible) to <u>support@dragino.com</u> so we can check.

6.2 Issue: "NBIOT did not respond"

11:24:22.397 [44596]NBIOT did not respond. 11:24:24.315 [46530]NBIOT did not respond. 11:24:26.256 [48464]NBIOT did not respond. 11:24:28.196 [50398]NBIOT did not respond. 11:24:30.115 [52332]NBIOT did not respond. 11:24:32.127 [54266]NBIOT did not respond.

- 11:24:32.127 [54299]Restart the module ...
- 11:24:39.181 [61332]No response when shutting down

This issue might due to initiate issue for NB-IoT module. In this case, please try:

- 1) Open Enclosure
- 2) Power off device by pull out the power on Jumper
- 3) Power on device by connect back the power jumper.
- 4) push reset button.



6.3 Issue: "Failed to read! MSI number"

[18170]Failed to read IMSI:1umber. [20109]Failed to read IMSI numoer. [22048]Failed to read IMSI number. [29842IRestart the module...

Make sure that the SIM card is insert in correct direction and device is power off/on during insert. Here is reference link: <u>Insert SIM Card</u>.

6.4 Why sometime the AT Command is slow in reponse?

When the MCU is communicating with the NB-IoT module, the MCU response of AT Command will become slower, it might takes several seconds to response.

RX1111:11:00.1201	OK	
[Rx][11:11:00.120]		Data Upload Process
[Rx][11:11:03.210]	[60883]Signa	l Strength:26
[Tx][11:11:06.053]	AT+TDC=60	Command Lost
[Rx][11:11:06.140]	[63816]****	Upload start:1*****
[Rx][11:11:06.180]	[63851]remai	ning battery =2978 mv
[Tx][11:11:10.339]	AT+TDC=60	3 seconds to reponse
[Rx][11:11:13.229]	[70891]dista	nce:0
[Rx][11:11:13.830]		
[Rx][11:11:13.830]	ОК	
[Rx][11:11:13.830]		
[Tx][11:11:13.839]	AT+TDC=60	3 seconds to reponse
[Rx][11:11:16.399]		
[Rx][11:11:16.399]	ОК	
[Rx][11:11:16.399]		
[Rx][11:11:18.409]	[76057]Datag	ram is sent by RF
[Rx][11:11:19.459]	[77091]Send	complete
[Rx][11:11:20.469]	[78115]****	End of upload*****
[Rx1[11:11:20.500]	-	

6.5 What is the Downlink Command by the NB device?

UDP:

Its downlink command is the same as the AT command, but brackets are required. Example:

AT+TDC=300

MQTT:

Json:

The Json format in MQTT mode needs to be configured with all commands. If you have configurations that need to be changed, please change them in the template below. Template:

```
{
"AT+SERVADDR":"119.91.62.30,1882",
"AT+CLIENT":"JwcXKjQBNhQ2JykDDAA5Ahs",
"AT+UNAME":"usenamedragino",
"AT+PWD":"passworddragino",
"AT+PUBTOPIC":"123",
"AT+SUBTOPIC":"321",
"AT+TDC":"7200",
"AT+INTMOD":"0",
"AT+APN":"NULL",
"AT+5VT":"0",
"AT+PRO":"3,5",
"AT+TR":"900",
"AT+NOUD":"0",
"AT+CSQTIME":"5",
"AT+DNSTIMER":"0",
```

```
"AT+TLSMOD":"0,0",
"AT+MQOS":"0",
"AT+TEMPALARM1":"0",
"AT+TEMPALARM2":"10",
"AT+TEMPALARM3":"0"
}
```

Hex:

MQTT's hex format. Since many commands need to support strings, only a few commands are supported.

The supported commands are consistent with LoRaWAN's hex commands. Please refer to the following link to obtain the hex format:

http://wiki.dragino.com/xwiki/bin/view/Main/End%20Device%20AT%20Commands%20and%20Downlink %20Command/

6.6 How to obtain device logs?

• AT Command: AT +GETLOG

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

Serial Port Utility - Personal Edition			
<u>File Edit View Tools Control H</u> elp			
	〇〇〇	Enter	the command
- Serial Port Setting	[Tx][19:18:51.683]	AT+GETLOG	
Port COM3(Silicon Lab V	[Rx][19:18:51.704]		
	[Rx][19:18:51.704	Exit sleep mode	
Baudrate 9600	[Rx][19:18:51.724	Signal Strength:99 *1	
Data Bits 8	[Rx][19:18:51.745	Signal Strength:18	
	[RX][19:18:51.764	Chan a Caskat Carvian averagefully	
Parity None	[RX][19:18:51.794	Uplead data successfully	
Stop Bits 1	[KX][13:10:21.022]	opioad data successfully	
	[Rx][19:18:51.865]	Close the port successfully	
From Type none	[Rx][19:18:51.895	Send complete	
- Receive Setting	[Rx][19:18:51.905	*****End of upload*****	
heeerre beeerng	[Rx][19:18:51.935		
• Text C Hex	[Rx][19:18:51.935]	Exit sleep mode	
- Auto Food Line	[Rx][19:18:51.954]	Signal Strength:10	
Auto reeu Line	[Rx][19:18:51.975]	*****Upload start:9*****	Print output
✓ Display Send	[Rx][19:18:52.005]	Open a Socket Service successfully	
✓ Display Time	[Rx][19:18:52.045]	Upload data successfully	
, Dispidy time	[Rx][19:18:52.065]	Close the port successfully	
Send Setting	[Rx][19:18:52.095]	Send complete	
G Taxt C Hay	[Rx][19:18:52.115]	*****End of upload*****	
I TEXL THEX	[Rx][19:18:52.144]		
□ Loop 1000 ÷ ms	[Rx][19:18:52.144]	Exit sleep mode	
Line by Line	[Rx][19:18:52.164]	Signal Strength:16	
	[By][10.10.53 104]	*****!!n]ood ctont:10****	
	[RX][19:10:52.104]	Open a Socket Service successfully	
	[Pv][19:18:52.204	Unload data successfully	
	[Rx][19:18:52.275	Close the port successfully	
	[Rx][19:18:52.305	Send complete	
	[Rx][19:18:52.315	*****End of upload*****	
	[Rx1[19:18:52.345		
	10.1140.40.53 3451	enda latin midi	
	AT+GETLOG		

6.7 How to find the AT Command Password if lost?

Why can't the password access AT command after upgrade(-NB)?

Because the new version of -NB firmware has updated the factory reset function, users can choose to restore all parameters to factory Settings, or keep the password to restore the rest of the parameters to factory Settings.

This update changes the password address of the firmware, so the password will be invalid after the customer upgrades from the old version of firmware (without FDR1 function) to the new version of firmware (with FDR1 function).

Two different restore factory Settings configurations.

AT command:

- AT+FDR // Reset Parameters to Factory Default.
- AT+FDR1 // Reset parameters to factory default values except for passwords.(new)

Version Confirmation

We are now dividing the **old firmware**(without FDR1 function) with the **new firmware**(with FDR1 function) by whether it contains FDR1 functionality. Please refer to the table:

General Model	Firmware version	Firmware version	
	(without FDR1 function)	(with FDR1 function)	
CPL03-NB, S31-NB, SN50V3-NB, TS01-NB, D20-NB, DS03A-NB, DDS04-NB, DDS45-NB, DDS20-NB, DDS75- NB, LDS12-NB, LDS40-NB, LMS01-NB, MDS120- NB, MDS200-NB, SE01-NB, SPH01-NB;	Before V1.2.1	After V1.2.1 (including V1.2.1)	
WL03A-NB, SDI-12-NB;	Before V1.0.2	After V1.0.8 (including V1.0.2)	
SW3L-NB, PS-NB;	Before V1.0.5	After V1.0.5 (including V1.0.5)	
RS485-NB	Before V1.0.8	After V1.0.8 (including V1.0.8)	

UART connection and firmware update methods

Users can query passwords only using the UART interface via the STM32CubeProgrammer.

See UART Connection.

update firmware through UART TTL interface : Instruction.

query the password via STM32CubeProgrammer

Users can use the password address to query the password through STM32CubeProgrammer.

- The password address for old firmware(without FDR1 function) : 0x08019000
- The password address for new firmware(with FDR1 function) : 0x08025D00

Notice: The password can only be queried after the firmware is run once.

Procedure for querying the password(old firmware):

- After the firmware upgrade is complete, switch back to the **FLASH** and reset the node to **run the firmware once**.
- Then place the switch at the **ISP** and connect to the STM32CubeProgrammer (same as when burning the firmware).
- · Click "Device memory", enter 0x08019000 in "Address", and click "Read"
- Find the 0x08019000 address field and then read the current password as shown in the screenshot below.

Prg STM	132CubeProgrammer								- 0 X
STM32	pammer						19	fi 🕒 🔰	* 🖅
≡	Memory & File	editing							Connected
	Device memory	Open file +						UART	 Disconnect
.	Address 0x0801	19000 🔻 Size	0x400	Data width 3	2-bit 👻 Find	Data Ox	Read 👻	UART	configuration
	Address	0	4	8	с	ASCI	I	Baudrate	
OR	0x08019000	33313639	30620000	31001C20	30023005	9613b0 .1.0.0	^	buddhute	115200 -
CPU	0x08019010	00000000	003D0900	00000000	38363632	=		Parity	Even 💌
	0x08019020	30373035	38333836	36363900	03840008	50706838.966		Data bits	8 🗸
swv	0x08019030	00000000	22382E38	2E382E38	222C2238	8.8"8.8.8"		Ston hits	
	0x08019040	2E382E34	2E342200	4E554C4C	00000000	4.8"4.LLUN		stop ons	1.0 👻
1	0x08019050	0000000	00000000	00000000	00000000		31690b	Flow control	Off 👻
	0x08019060	0000000	00000000	00000000	00000000			RTS	0
	0x08019070	00020000	00000000	00000000	00000000			DTR	-
	0x08019080	0000000	0000000	00000000	0000000			DIK	0
	0x08019090	0000000	00000000	00000000	0000000		>	Read Unprotect (MCL TZEN Regression (MC	ກ 📕 10ງ 📕
	Log				Live U	pdate Verbosity level 🥡	1 2 3		
	17:15:44 : UPLOADIN	IG					^ 🛃	Targe	et information
	17:15:44 : 5ize 17:15:44 : Address	: 1024 Bytes : 0x8019000						Board	
•	17:15:44 : Read prog	ress:						Type	STM32L07x/L08x/L010 MCU
\bigcirc	17:15:45 : Data read	ed during the read op	eration is: 00:00:01	.269				Device ID Revision ID	0x447
<u> </u>							~	Flash size	192 KB - Default
(?)							100%	CPU Bootloader Versio	Cortex-M0+
							130%		

Procedure for querying the password(new firmware):

Refer to the old and new firmware division above, and run the firmware first after updating the firmware.

- After the firmware upgrade is complete, switch back to the **FLASH** and reset the node to **run the new firmware once**.
- Then place the switch at the **ISP** and connect to the STM32CubeProgrammer (same as when burning the firmware).
- Click "Device memory", enter 0x08025D00 in "Address", and click "Read"
- Find the 0x08025D00 address field and then read the current password as shown in the screenshot below.

Pro STN	132CubeProgrammer								- 0 X
STM32	l nammer						(19)	f 🕨 У	* 🖅
=	Memory & File	editing							Connected
	Device memory	Open file +						UART	 Disconnect
.	Address 0x0802	5D00 👻 Size	0x400	Data width 32	2-bit 👻 Find	i Data Ox	Read 🔹	UART Port	configuration
	Address	0	4	8	с	ASCII		Baudrate	
OB	0x08025D00	31323334	35360000	00000000	00000000	432165	<u>^</u>		115200 👻
CPUI	0x08025D10	00000000	00000000	00000000	00000000			Parity	Even 👻
Cr u	0x08025D20	00000000	00000000	00000000	00000000			Data bits	8
swv	0x08025D30	00000000	00000000	00000000	00000000			Stop hits	
	0x08025D40	00000000	00000000	00000000	00000000	12	3456	Stop bits	1.0 💌
$\overline{\bigcirc}$	0x08025D50	00000000	00000000	00000000	00000000		5150	Flow control	Off 🔹
	0x08025D60	00000000	00000000	00000000	00000000			RTS	0
	0x08025D70	00000000	00000000	00000000	00000000			DTP	
	0x08025D80	00000000	00000000	00000000	00000000			UIK	0 🔻
	0x08025D90	00000000	00000000	00000000	00000000		> ▼	Read Unprotect (MCU TZEN Regression (MC) -
	Log				Live U	pdate Verbosity level 💿	1 2 3		
\mathbf{v}	17:58:10 : UPLOADIN	G						Targe	t information
	17:58:10 : Size 17:58:10 : Address	: 1024 Bytes : 0x8025D00						Board	
W	17:58:10 : Read progr	ess:						Device Type	STM32L07x/L08x/L010 MCU
\bigcirc	17:58:11 : Data read s 17:58:11 : Time elapse	accessfully ed during the read op	eration is: 00:00:01	.271				Device ID	0x447
<u> </u>) >	Flash size	192 KB - Default
?							100% 🗵	CPU Bootloader Versio	Cortex-M0+

Special case

If the user has never changed the password manually, the user cannot find the valid password through the above two password addresses. In this case, the valid password is still the original password on the node box label (**AT** +**PIN**).

Invalid query screenshot example:

M STN	132CubeProgrammer								-	
STM32 CubePro	grammer						<u>(19)</u>	f 🕒 🕚	\sim	57
	Memory & File	editing							Con	inected
	Device memory	SN50V3-NB-GE.bin	+					UART	v D	isconnect
.	Address 0x0802	SD00 - Size	0x400	Data width	32-bit 👻 Find	Data Ox	Read 🔫	UART Port	configurati	on
	Address	0	4	8	с	ASCI		Baudrate		
	0x08025D00	00000000	00000000	00000000	00000000		<u>^</u>	Provide and	115200	
СРИ	0x08025D10	00000000	00000000	00000000	00000000			Panty	Even	-
<u> </u>	0x08025D20	00000000	00000000	00000000	00000000			Data bits	8	-
swv	0x08025D30	0000000	00000000	00000000	00000000			Stop bits		
	0x08025D40	00000000	00000000	00000000	00000000			orop ono	1.0	· ·
1	0x08025D50	00000000	00000000	00000000	00000000			Flow control	Off	-
	0x08025D60	00000000	00000000	00000000	00000000			RTS	0	Ţ
	0x08025D70	00000000	00000000	00000000	00000000			DTR		
	0x08025D80	00000000	00000000	00000000	00000000			DIK	0	*
	0x08025D90	00000000	00000000	00000000	00000000		×	Read Unprotect (MC	n 📕	
	N							12th Regression (M		
	Log				Live U	pdate Verbosity level 🧕) 1 🔵 2 🔵 3			
	17:29:24 : UPLOADIN 17:29:24 : Size	G 1024 Butes					^ &	Targ	et informati	on
	17:29:24 : Address	: 0x8025D00						Board	571422	
-	17:29:24 : Read prog	ress:						Туре	5111520	MCU
\bigcirc	17:29:26 : Time elaps	ed during the read op	eration is: 00:00:01	.272				Device ID Revision ID		0x447
	L						~	Flash size		92 KB - Default
(?)							100%	Bootloader Versi	on	Contex-M0+

Home - General Configure/Commands to Connect to IoT server for -NB & -NS NB-IoT models

Pto STN	132CubeProgrammer								- 0	×
STM:2	prammer						(19)	f 🕒 🕚	• 🛪 🗲	7
≡	Memory & File	editing							Connected	
	Device memory	SN50V3-NB-GE.bir	n +					UART	 Disconnec 	t
.	Address 0x080	19000 🔻 Size	0x400	Data width	32-bit 🔻 Find	i Data Ox	Read 👻	UART Port	configuration	0
OB	Address 0x08019000	0 0801BB5C	4 0801BB60	0000008	000007p0	ASCII	^	Baudrate	115200	•
CPU	0x08019010	08015470 08018860	080151AD	08015471 000001E4	0801885C)TTqT\»		Parity Data bits	Even	•
SWV	0x08019020	08015EE5	08015EA9	0801BB5C	0801BB60	å^0^\»`»		Stop bits	8	× ×
1	0x08019040 0x08019050	08015F29	000001F4 0801BB5C	08015F35	0000000B)\»`»		Flow control	Off	•
	0x08019060 0x08019070	0000012C 0801BB5C	080159CD 0801BB60	08015A1D 0000000C	08015969 0000012C	,ÎYZiY ∖»`»,		RTS	0	*
	0x08019080 0x08019090	0801569D 0801BB60	08015965 0000000D	08015671 0000012C	0801BB5C 08015419	.VeYqV\» `»T	~	Read Unprotect (MC		
	Log				Live L	Ipdate Verbosity level 🔘	1 2 3	12EN Regression (M	.0)	
	17:30:02 : UPLOADIN 17:30:02 : Size 17:30:03 : Address	NG : 1024 Bytes					^ 4	Targ Board	et information	
	17:30:02 : Address 17:30:02 : Read prog 17:30:03 : Data read	ress: successfully						Device Type Device ID	STM32L07x/L08x/	L010 MCU 0x447
	17:30:03 : Time elap:	sed during the read op	eration is: 00:00:0	1.272			~	Revision ID Flash size CPU	192 KB - De Cortex-	efault MO+
$\langle \cdot \rangle$							100% 🗵	Bootloader Versie	on	