

SENSO8 NB-IoT UART Configuration Guide

Table of Contents

1. Introduction	1
2. CONFIG Port Pin Assignment	1
3. Equipment Required	1
4. Configuring frequency bands on SENSO8 NB-IOT sensor	2
5. Configuring MQTT broker on SENSO8 NB-IOT sensor using Python script	4
5.1. Prerequisite	4
5.2. Instructions	6
6. Configuring MQTT topics on SENSO8 NB-IOT sensor	6
6.1. Instructions	7
7. Configuring TCP socket local port on SENSO8 NB-IOT sensor	8
7.1. Instructions	8
8. Revision History	10

1. Introduction

This guide aims to provide a quick reference for configuring the SENSO8 NB-IoT sensor through the on-board UART CONFIG port.

2. CONFIG Port Pin Assignment

Pin Number	Function
1	+3.0V voltage from SENSO8, the UART signal voltage level
2	RX pin, receive data from computer
3	TX pin, transmit data to computer
4	Ground

3. Equipment Required

- Computer with USB port and serial terminal program (e.g. putty)

Serial port settings: baud rate: 115200, format: N81, flow control: none

- USB-to-UART serial with external I/O voltage supported. The UART I/O voltage of the USB-to-UART should follow pin 1 on the CONFIG port on SENSO8.

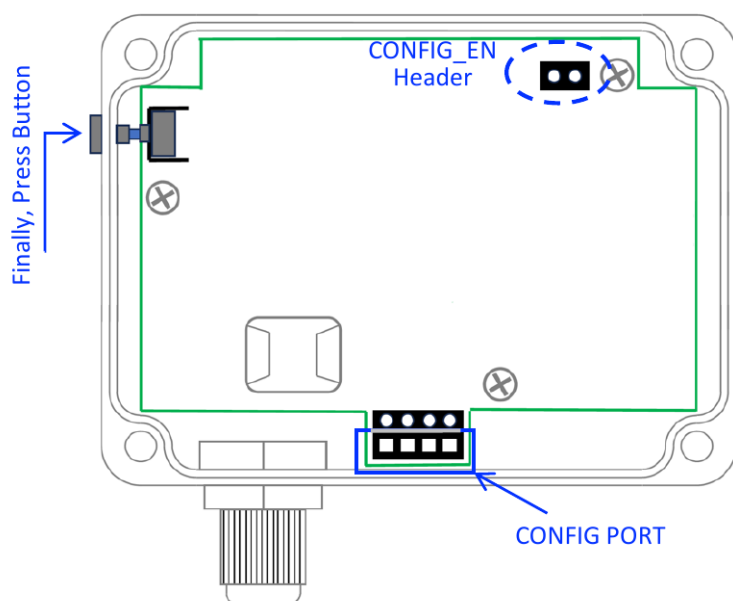
4. Configuring frequency bands on SENSO8 NB-IOT sensor

By default, frequency bands are selected automatically according to the SIM card that inserted. For flexibility, SENSO8 offers an option to allow working frequency bands to be selected manually.

Instructions

1. Short the CONFIG_EN header with a jumper.
2. Connect a USB-to-UART converter to CONFIG PORT.

UART-to-USB	SENSO8
VCCIO	+3.0V
TXD	CONFIG_RX
RXD	CONFIG_TX
GND	GND



3. Open a serial terminal software on the computer and connect it to the USB-to-UART converter.
4. Insert an ER26500 battery to the battery holder and press the user button to power up the device.
5. Type the password when it prompts for it. Please contact your sales representative for the device password.

```
=====
type password:

```

6. Type '1' to select 'Network Settings'.

```
=====
Main Menu
1. Network Settings
2. MQTT Broker Settings
3. MQTT Client Settings
4. Device Settings
5. Change Password
6. Test Hardware
7. Test NB-IoT
8. Test RTC
9. Device Advanced Settings
A. Exit

```

7. Type '5' to select 'Frequency Band'.

```
=====
Network Settings
1. APN
2. PSM Active Timer (T3324)
3. PSM Periodic TAU Timer (T3412)
4. SIM card registration timeout
5. Frequency Band
6. Back

```

8. Type '1' to change the Frequency Band.

```
=====
Frequency Band: AUTO
1. Change
2. Back

```

9. Type '2' to disable AUTO frequency band selection.

```
Enable AUTO?

Confirm?
1. Yes
2. No

```

10. The terminal will prompt the frequency band supported one by one. If it is desired to select the band, type '1'. Otherwise, type '2' to disable the frequency band. It is possible to select multiple frequency band.

```

Enable AUTO?
Confirm?
1. Yes
2. No

Enable Band 1?
Confirm?
1. Yes
2. No

Enable Band 3?
Confirm?
1. Yes
2. No

Enable Band 5?
Confirm?
1. Yes
2. No

Enable Band 8?
Confirm?
1. Yes
2. No

Enable Band 20?
Confirm?
1. Yes
2. No

```

11. After selecting all the frequency band(s), it will show the frequency bank(s) selected. Type '1' to confirm the frequency band(s) selected are correct.

```

New Frequency Band: 3, 8
Confirm?
1. Yes
2. No

```

12. After confirming the selection, the terminal will return to the main menu. Type 'A' to exit. Then remove the battery and USB-to-UART convert from the board.

5. Configuring MQTT broker on SENSO8 NB-IOT sensor using Python script

In order to facilitate the MQTT broker configuration on SENSO8 NB-IOT sensor, python script is provided to configure the MQTT broker setting automatically.

5.1. Prerequisite

1. Pre-install Python3.x on your host computer.

Python3.x can be downloaded from <https://www.python.org/downloads/>. Please follow its instruction to install.

After installation, open a command prompt and type “python3 --version” (or “python --version” which depends on your host computer OS) to verify the python version

2. Pre-Install the pyserial package for python3.x

Windows' user

Open a command prompt and run “pip install pyserial”

Mac's user

Open a terminal and run “python3 -m pip install pyserial”

Ubuntu's user

Open a terminal and run “sudo apt-get install python3-serial”

3. Edit the MQTT broker configuration file

senso8_cfg.py senso8_mqtt_cfg.txt

The tool consists of 2 files: “senso8_cfg.py” is the python script to run and “senso8_mqtt_cfg.txt” contains the MQTT broker information to configure.

Please open “senso8_mqtt_cfg.txt” in any editor to edit your MQTT broker info.

```
ip=mqtt.broker.io
port=1883
usr=arwin
pwd=arwin
```

“ip” is the MQTT broker address.

“port” is the MQTT broker port number.

“usr” is the login name of MQTT broker. If login name is not required, just new line after ‘=’.

“pwd” is the login password of MQTT broker. If login password is not required, just new line after

‘=’,

5.2. Instructions

1. Short the CONFIG_EN header with a jumper.
2. Connect a USB-to-UART converter to CONFIG PORT.
3. Connect the USB-to-UART converter to your computer and then find out the COM port that enumerate on your host computer. (For Windows user, please use “Device Manager”)
4. Insert an ER26500 battery to the battery holder. DO NOT press the user button to power up the device at this moment
5. Open command or terminal and type “**python3 senso8_cfg.py <UART-SerialDevice>**” run the python script. The python script takes 1 argument: <UART-SerialDevice> which is the COM port of the USB-to-UART converter.
On Windows, <UART-SerialDevice> should be COMx.
On Ubuntu, <UART-SerialDevice> should be /dev/ttyUSBx.
On macOS, <UART-SerialDevice> should be /dev/tty.usbserial-XXXXXXX.
6. If the script is launched successfully, it will prompt “Waiting for SENSO8”.

```
MQTT configuration ready
Serial port connected
Press Ctrl+C to terminate the program

Waiting for SENSO8 .
Connected to SENSO8
Sending configuration data
Configuration successful
Remove the SENSO8 and connect a new one
```

7. Press the user button to power up the device. If the script detects a UART connection from SENSO8, it will download the MQTT broker info to it. When succeeds, it will show “Configuration successful” and “Remove the SENSO8 and connect a new one”.
8. Remove the battery from SENSO8 and disconnect the USB-to-UART converter from it.
9. Repeat step 1, 2, 4, 7, 8 to continue MQTT configuration for next SENSO8. Otherwise, type “Ctrl+C” to quit the script.

6. Configuring MQTT topics on SENSO8 NB-IOT sensor

By default, SENSO8 publishes MQTT topic “SENSO8/nbiot/data/<IMEI>” for data and “SENSO8/nbiot/sys/<IMEI>” for device configuration. It also listens to MQTT topic “SENSO8/nbiot/ctrl/<IMEI>” for downlink command.

The string formats after “SENSO8” in MQTT topics is fixed for all SENSO8 sensors and cannot be changed. However, the prefix “SENSO8” in the MQTT topics can be customized.

6.1. Instructions

1. Short the CONFIG_EN header with a jumper.
2. Connect a USB-to-UART converter to CONFIG PORT.
3. Open a serial terminal software on the computer and connect it to the USB-to-UART converter.
4. Insert an ER26500 battery to the battery holder and press the user button to power up the device.
5. Type the password when it prompts for it. Please contact sales representative for the device password.

```
=====
type password:

```

6. Type ‘3’ to select ‘MQTT Client Settings’.

```
=====
Main Menu
1. Network Settings
2. MQTT Broker Settings
3. MQTT Client Settings
4. Device Settings
5. Change Password
6. Test Hardware
7. Test NB-IoT
8. Test RTC
9. Device Advanced Settings
A. Exit

```

7. Type ‘2’ to select ‘MQTT Customer Topic Prefix’.

```
=====
MQTT Client Settings
1. MQTT Client ID Prefix
2. MQTT Customer Topic Prefix
3. MQTT hide IMEI in Topic
4. Back

```

8. The terminal will show the current prefix in MQTT topics. By default, it is “SENSO8”. Type ‘1’ to change the MQTT topic prefix

```
=====
MQTT Customer Topic Prefix: SENS08
1. Change
2. Back
```

9. The terminal will prompt for new prefix. Type in the new topic prefix and press 'ENTER'. In this example, "SENSO8/NewPrefix" is typed and the new MQTT data topic will become "SENSO8/ NewPrefix/nbiot/data/<IMEI>", the new device configuration topic will become "SENSO8/ NewPrefix/nbiot/sys/<IMEI>" and the new downlink command topic will become "SENSO8/ NewPrefix/nbiot/ctrl/<IMEI>".

```
Please input new prefix (1-31 characters):
SENS08/NewPrefix
New MQTT Customer Topic Prefix: SENS08/NewPrefix

Confirm?
1. Yes
2. No

SUCCESS
```

10. To discard the change, type '2'. Otherwise type '1' to confirm the new prefix and save it. If succeeds, "SUCCESS" will be shown.
11. After step 10, it will be back to "MQTT Client Settings" menu (see step 7). Type '4' to back to main menu and type 'A' to exit. Then remove the battery and USB-to-UART convert from the SENS08.

7. Configuring TCP socket local port on SENS08 NB-IOT sensor

The local port number when opening a TCP socket in SENS08 is a pseudo-random port value. It can be generated either from the NB-IOT module or the device's micro-controller. This session describes how to switch between these 2 options.

7.1. Instructions

1. Short the CONFIG_EN header with a jumper.
2. Connect a USB-to-UART converter to CONFIG PORT.
3. Open a serial terminal software on the computer and connect it to the USB-to-UART converter.
4. Insert an ER26500 battery to the battery holder and press the user button to power up the device.
5. Type the password when it prompts for it. Please contact sales representative for the device password.

```
=====
type password:

```

6. Type '9' to select 'Device Advanced Settings'.

```
=====
Main Menu
1. Network Settings
2. MQTT Broker Settings
3. MQTT Client Settings
4. Device Settings
5. Change Password
6. Test Hardware
7. Test NB-IoT
8. Test RTC
9. Device Advanced Settings
A. Exit

```

7. Type '3' to select 'TCP local port option'.

```
=====
Device Advanced Settings
1. Alert repeat count
2. Alert repeat interval
3. TCP local port option
4. SYS message report interval
5. Back

```

8. The terminal will show the current TCP socket local port option, which is "Modem" is this picture. Type '1' to switch to alternative option "Device"

```
=====
TCP local port option: Modem
1. Generate TCP local port number from Device
2. Back

```

9. The terminal will show the new TCP socket local port option, which is "Device" in this picture. Type '1' to confirm this new option. Otherwise, type '2' to discard the change. If '1' is typed, the new option will be saved and the terminal will prompt "SUCCESS".

```
Generate TCP local port number from Device?
Confirm?
1. Yes
2. No
SUCCESS

```

10. After step 9, the terminal will be back to "Device Advanced Settings" menu (see step 7). Type

‘5’ to back to main menu and type ‘A’ to exit. Then remove the battery and USB-to-UART convert from the board.

8. Revision History

<i>Revision</i>	<i>Date</i>	<i>Description</i>
1.0	May 2020	Initial Release.
1.1	Sept 2020	Added links to table of content.
1.2	Sept 2023	Insert information & drawings for CONFIG_EN & CONFIG PORT
2.0	Oct 2026	First release on docs.senso8.com