sigfox

SNT 1.1

User Guide

February 2017

Revision history:

Rev.	Date	Author	Change description
0.1	08/02/2017	A. Trombetta	Preliminary version
0.2	13/02/17	A. Trombetta	Tables of command and LED
0.3	16/02/2017	A. Trombetta	SNT photo
0.4	20/02/17	A. Trombetta	Added command to table
0.5	22/02/17	A. Trombetta	Clarify display type in backend
1.0	16/05/17	A. Trombetta	SNT 1.1

Contents

I. Introduction

   Sigfox Network Tester (SNT), is a Sigfox device provided exclusively for technology evaluation and network coverage reference measurements.
Its primary functionality consists in periodic transmission of Sigfox radio messages meant for reception at any Sigfox Access Points. Each SNT has a unique network identity, printed on a sticker at the back and stored into its memory. With this ID, full retrieval of the device activity is possible through the OSS portal.

SNT 1.1 is available in 4 versions to cover worldwide RF requirements:
SNT1.1-1, SNT1.1-2, SNT1.1-3, SNT1.1-4

Antenna

LED

ON/OFF button

Micro USB port

II. Requirements

1. Radio considerations

SNT serves as reference device. It is equipped with a 1⁄2 wave antenna. For reference performance level, classical radio precautions have to be observed during operation: antenna vicinity has to be cleared of any metallic object, and antenna shall be kept in vertical position.
Note that Sigfox Network optimal performance is obtained in stationary operation.

2. Cable connection

SNT comes with a micro USB to USB cable.
SNT is equipped with a rechargeable battery. When the device is connected to a USB charger or a USB socket of a computer, it will start to charge automatically (blue LED). The device can be used while charging.
The battery takes about 3 hours to fully charge.

SNT can be used and controlled by computer using the same USB cable. In this case, check the Software requirements (below).

3. Software requirements

SNT is controlled by AT commands and works with Windows, Linux and Mac. Just make sure you to have:
- FTDI drivers installed on your computer
- Any soft to open serial port like Putty for Windows, Screen or Cutecom on Linux

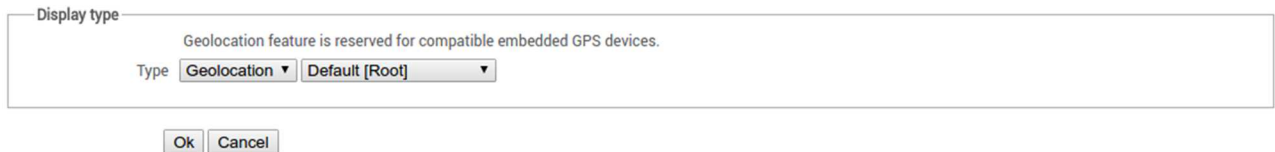*See SNT drivers installation guide for detailed information.*

4. Registration in the Backend

Each device needs to be registered in the OSS Portal (Backend interface).
In Device type configuration, you can configure the **display type**.
Depending on how you will use your SNT, you can configure it like this:

- To have GPS location displayed in the Backend, select in Type: Geolocation and Default [Root] :

- To get information about battery and frame counter, select Type : Custom and Custom configuration with :
  Vdd::uint:16 NA::uint:16 NA1::uint:16 NA2::uint:16 CounterDL::uint:16 CounterUL::uint:16

III. SNT operational modes

SNT has two operational modes: standalone and serial communication.

The device shall be used hand-held in upright position only. Alternatively the device may be used when put on the desk or an supporting structure.
The device is not designed and must not be used nearby body like belt-worn, lanyard around the neck or put into pocket.

1. Standalone

Pressing the button for a few seconds will activate the device. The LED lights blue as the device turns on. Then the device will execute the sequences described below.
SNT has two main options: monodirectional (uplink only) and bidirectional sequences (uplink and downlink).
By default, SNT is set to Uplink mode. These modes can be set by AT commands (see next chapter).
These sequences are looped 10 times, then device shuts down automatically.

A. Uplink sequence

Just after powering up, SNT sends a SIGFOX message every 10 minutes by default. This option can be set by AT commands. This message contains GPS information if available.
When SNT is sending, green led is blinking.

Between two messages, SNT led can be of one of these two colours:
- Green if internal GPS is fixed
- Orange if it is not the case

B. Bidirectional sequence

In this mode the device is sending and receiving frames. The LED colour is pink.

   The sequence is:
1. **TX** :   device sending an uplink message.
2. **IDLE**:   device in wait state (20 seconds)
3. **RX**:   device in receive mode (timeout after 25 seconds)

Depending on the reception result, there are two possible cases:

> case 1: sequence completion by **successful** downlink frame reception
4. Led blinking in green, indicating successful message reception and send an OOB message
5. **Link quality indication** is displayed for 10sec (details below)

Or

> case 2: sequence completion timeout after 25 secs (NO frame received)
4. LEDs blinking in RED 3 times (~6seconds)

Link quality indication:
Providing the Backend direct callback is used and includes uplink RSSI, the link quality is flashed using a LED code:

- LINK QUALITY = VERY GOOD   → Blinks 3 times (WHITE)

- LINK QUALITY = GOOD   → Blinks 2 times (WHITE)

- LINK QUALITY = AVERAGE   → Blinks 1 time (WHITE)

Note: The white LED may appear slightly pink.

C. Uplink frame format

SIGFOX payload is composed of 12 bytes. The format of payload is available in the following table.

State	GPS	GPS state	0	1	2	3	4	5	6	7	8	9	10	11
									Uplink bits						
Uplink only	ON	Fixed	Coded Latitude				Coded Longitude				DOP,sat	Speed	Uplink counter	
		Not fixed	0xFF	0xFF	0xFF	0xFF	0xFF	0xFF	0x00	0x00	0x00	0x00	Uplink counter	
	OFF	N/A	Vdd value		0x00	0x00	0x00	0x00	0x00	0x00	0x00	0x00	Uplink counter	
bidirectionnal	ON	Fixed	Coded Latitude				Coded Longitude				DOP,sat	Speed	Uplink counter	
		Not fixed	0xFF	0xFF	0xFF	0xFF	0xFF	0xFF	0x00	0x00	Downlink counter		Uplink counter	
	OFF	N/A	Vdd value		0x00	0x00	0x00	0x00	0x00	0x00	Downlink counter		Uplink counter	

Note: Vdd in mV

2. Serial AT commands operation

AT commands can be sent to the device by connecting the USB cable to a computer and opening a serial interface.

All the basics available commands are listed here:

Commands	Responses	Descriptions and comments	Default values
AT	OK	Attention command. Just to be sure that all works fine!	
AT?	<cmdlist> OK	Requests summary of available AT commands	
AT&V	<device info>	Display device version information (SNT type, SW version, ID, PAC)	
AT$SF=<value>,<ack>	OK	Send a Sigfox Frame. Value must be in hex format by byte (ex : AABB74)	
AT$NC=<value>	OK	Change number cycle before shutdown. Value > 0. Or 0 for infinite	10
AT$NC?		Current value	10
AT$BI=<value>	OK	Enable (1) or disable (0) bidirectional mode	0
AT$BI?		Current value	0
AT$ID=<value>	OK	Change inter-message delay in seconds. 0 < Value < 65536	600
AT$ID?		Current value	600
AT$GPS=<value>	OK	Enable (1) or disable (0) GPS. Value 0 improve SNT battery life	1
AT$GPS ?		Current value	1
AT$FSD=<value>	OK	Set Delay before first message (in second) 0 < Value < 65536	2
AT$FSD ?		Current value	2
AT$OT=<value>	OK	Enable (1) or disable (0) OneTouch mode (describe bellow)	0
AT$OT?		Current value	0
AT$FP=<value>	OK	Enable (1) or disable (0) Factory reset. You need restart after with "ATR\r" command	

AT$FP?	Current value	
ATR	Soft reset	

<u>AT$OT for OneTouch</u>

When this command is at 1, the SNT send only one Sigfox message instantly after having pushed the button.
This frame is: "HELLO WORLD!" in ASCII.

3. LED recapitulative table

Here is a recapitulative of the lights' sequences and their meanings:

Mode	LED colour	Meaning
On	**Blue**	Device turning on
Uplink mode sequence	**Green**	Sending 3 frames
	Flashing **orange**	Searching GPS
	Flashing **green**	GPS found
Bidirectional mode sequence	**Green** blinking x3	Sending 3 frames
	Flashing **pink**	Waiting for Backend response
	Green Flashing x1	Successful msg reception + send OOB msg
	White flashing x3	Very good link quality
	White flashing x2	Good link quality
	White flashing x1	Limit link quality
	Red flashing x3	Failed to receive frame
	Slow flashing **pink**	Idle time before new cycle
Off	**Red**	Device turning off
Connected	Fixed **blue**	Device charging or charged

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IV. WARNING STATEMENTS

1. FCC:

This device complies with Part 15 of the FCC Rules.
- Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) This device must accept any interference received, including interference that may cause undesired operation.

- The radiated output power of the device is far below the FCC radio frequency exposure limits. Nevertheless, the device shall be used in such a manner that the potential for human contact during normal operation is minimized.
- Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

2. IC

English
This device complies with Part 15 of the FCC Rules and with Industry Canada license-exempt RSS standard(s).
Operation is subject to the following two conditions:
this device may not cause harmful interference, and
this device must accept any interference received, including interference that may cause undesired operation.

Français
Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux

appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :
(1) l'appareil ne doit pas produire de brouillage, et
(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

3. CE

Do not throw away in the normal household waste. The device must be disposed of in the same way as other electronic equipment following local procedures.

4. Japan

Japanese Radio Law and Japanese Telecommunications Business Law Compliance. This device is granted pursuant to the Japanese Radio Law (電波法) .

This device should not be modified (otherwise the granted designation number will become invalid).