TABLE OF CONTENTS

1. GENERAL INFORMATION ABOUT BLUETOOTH LOW ENERGY 3
2. BLUETOOTH LOW ENERGY PRODUCTS BY ELA INNOVATION 4
3. BLUE RANGE OPERATIONS BY ELA INNOVATION 5
3.1. REGULAR OPERATING MODE 5
3.2. SPECIFIC OPERATION MODES 6
4. ELA INNOVATION BLUE RANGE CONFIGURATION 9
4.1. GENERALITIES 9
4.2. BLUE RANGE TAG COFIGURATION WALK-THROUGH EXAMPLES 11
4.2.1. Tag configuration using device manager PC SOFTWARE 11
4.2.2. Tag configuration using a smartphone 13
4.2.3. Settings Restriction 13
4.2.3.1. Restriction applying to “Name” field 13
4.2.3.2. Datalogger restrictions 13
4.2.3.3. Connected mode restrictions 13
4.2.3.4. Other restrictions 13
4.3. SPECIFIC CONFIGURATION 14
5. FRAME FORMAT AND CONTENT 21
5.1. GENERALITIES 21
5.2. SENSOR DATA IN “SERVICE DATA” FRAME (Legacy) 22
5.3. SENSOR DATA IN “MANUFACTURER SPECIFIC DATA” FRAME (Legacy) 25
5.4. SCAN RESPONSE FRAME (legacy) 27
5.5. BATTERY INFORMATION (legacy) 27
5.6. INFORMATION ABOUT IBEACON, EDDYSTONE 29
5.7. CUSTOM FRAME FORMAT 30
5.8. DATA VIZUALISATION USING DEVICE MANAGER 35
6. CONNECTED MODE OPERATION 38
6.1. CONNECTED MODE LIST OF COMMAND 38
6.2. SIMPLE DATA LOGGER 39
6.3. EN12830 DATA LOGGER (BLUE PUCK T EN12830 & BLUE PUCK TPROBE) 40
6.4. CONNECTED MODE RESTRICTIONS 40
6.5. CONNECTING TO A ELA INNOVATION BLE TAG 40
7. PRODUCT OPERATION 43
8. NORMS & STANDARDS 44

1. GENERAL INFORMATION ABOUT BLUETOOTH LOW ENERGY

Bluetooth **Low Energy** technology is also called **LE** or **BLE Bluetooth**. This technology appeared in 2010 with the release of version 4.0 of the Bluetooth Core Specification.

Bluetooth Low Energy is an alternative to "classic Bluetooth". By "classic Bluetooth", we mean all versions of Bluetooth released before Core Specification 4.0.

Low Energy Bluetooth technology operates in the free band **ISM 2.4 GHz**. This technology relies on a **frequency hopping radio**. 40 physical channels are allocated and separated from each other by 2 MHz and used according to the FDMA. Three of them consist in **advertising channels** (they might be considered as signalization) and all the others are data channels. In contrast, conventional Bluetooth uses 80 channels separated from each other by 1 MHz.

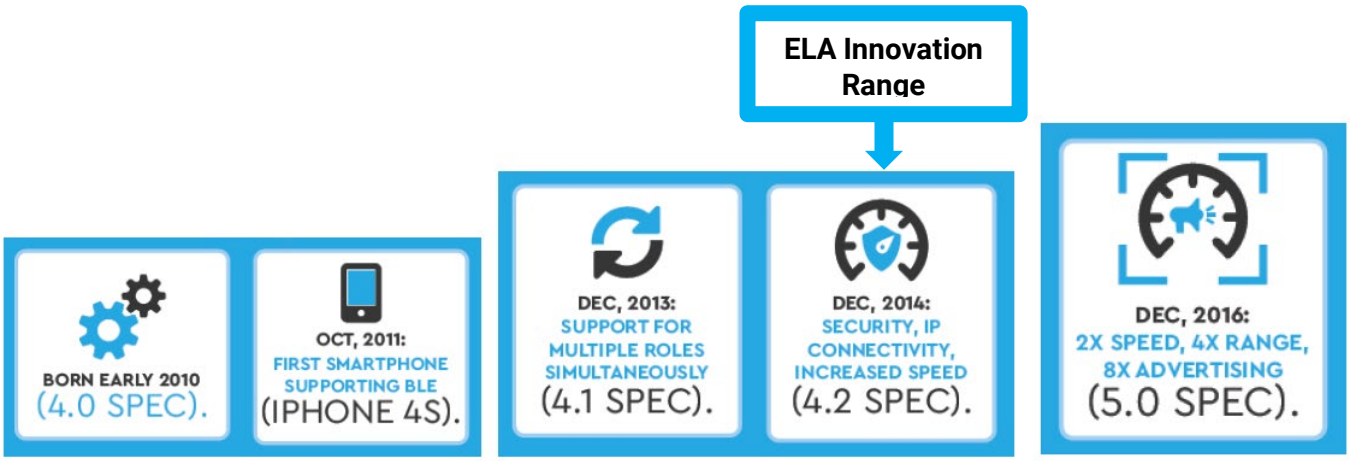


Figure 1: Evolution of Bluetooth Low Energy versions

Bluetooth SIG is the current standard in terms of information and specifications. The **Bluetooth Special Interest Group**, known as **SIG**, is the body that oversees the development of Bluetooth specifications, manages the various technology qualification processes and grants the needed licenses of the Bluetooth brand and technology to manufacturers.

Bluetooth SIG website	https://www.bluetooth.com/bluetooth-technology
BLE Specification	https://www.bluetooth.com/specifications
BLE Services and features	https://www.bluetooth.com/specifications/gatt

2. BLUETOOTH LOW ENERGY PRODUCTS BY ELA INNOVATION

DESIGNATION	*PRODUCT REFERENCE*	*DESCRIPTION*
Blue PUCK **ID**	IDF25240x	Tag Bluetooth PUCK Format with Identifier Option – iBeacon – Eddystone
Blue PUCK **BUZZ**	IDF25245x	Tag Bluetooth PUCK format with Identifier Option – Buzzer
Blue PUCK **T**	IDF25241x	Tag Bluetooth PUCK Format with integrated temperature sensor
Blue PUCK **T EN12830**	IDF30241x	Tag Bluetooth Format PUCK, integrated temperature sensor, EN12830 (2018) certified
Blue PUCK **T PROBE**	IDF25250x	Tag Bluetooth Format PUCK external temperature probe, EN12830 (2018) certified
Blue PUCK **RHT**	IDF25242x	Tag Bluetooth PUCK Format with humidity and temperature sensor option
Blue PUCK **MAG**	IDF25243x	Tag Bluetooth PUCK Format with magnetic sensor option
Blue PUCK **MOV**	IDF25244x	Tag Bluetooth PUCK Format with motion sensor option
Blue PUCK **PIR**	IDF25249x	Tag Bluetooth PUCK format with presence detection sensor
Blue PUCK **PROXIR**	IDF25252x	Tag Bluetooth PUCK format TOF infrared Ranging sensor
Blue PUCK **DI**	IDF24246x	Tag Bluetooth PUCK Format with digital input option
Blue PUCK **DO**	IDF25247x	Tag Bluetooth PUCK Format with digital output option
Blue PUCK **AI**	IDF25248x	Tag Bluetooth PUCK Format with analog input option
Blue COIN **ID**	IDF10240x	Tag Bluetooth Format COIN with Identifier option – iBeacon – Eddystone
Blue COIN **T**	IDF10241x	Tag Bluetooth COIN Format with temperature sensor option
Blue COIN **MAG**	IDF10243x	Tag Bluetooth COIN Format with magnetic sensor option
Blue COIN **MOV**	IDF10244x	Tag Bluetooth COIN Format with motion sensor option
Blue SLIM **ID**	IDF03240x	Tag Bluetooth SLIM Format with Identifier option– iBeacon – Eddystone
Blue LITE **ID**	IDF28240x	Tag Bluetooth LITE Format with Identifier option– iBeacon – Eddystone
Blue WATCH **ID**	IDP27240x	Tag Bluetooth WATCH Format with Identifier option– iBeacon – Eddystone

3. BLUE RANGE OPERATIONS BY ELA INNOVATION

3.1. REGULAR OPERATING MODE

- **Advertising Mode**

Frames are disseminated through "**Advertising**". Packets are sent periodically at a configurable recurrence comprised within the [0.1s; 10s] interval (firmware version $< 4.0.0$) and in the [0.1s; 86400 s] interval (firmware version $> 4.0.0$, (see section 2.5).

User data size is of 29 bytes. Data content are sensor information or fixed identifier, according to product (Identifier or Sensor). **For firmware version ≥4.0.0 advertising content and format can be fully customized on demand**

*See Frames Specifications document and section 5 of this document for more information on data sent and advertising frame format in "**Advertising**" mode.*

In some cases, a "**Scan Response**" frame may follow the "**Advertising**" frame:

- ✓ Battery level below 15%: battery level service available in the Scan Response section.
- ✓ A 15-character "Name" added in iBeacon or Eddystone UID format: "*Complete Local Name*" available in the "*Scan Response*" section.

- **Connected Mode**

The BLUE product range by ELA Innovation uses several functions in "Connected Mode". A link is set up between two devices and only these devices can communicate and exchange with each other.

You may establish a connection using a smartphone with a mobile application, or with a PC equipped with the ELA "*Device Manager*" application (provided you activated Bluetooth or connected a BLE dongle to the PC).

- ✓ Once you enter "*Connected Mode*", "***Advertising***" **is stopped by default**.
- ✓ It is possible to send commands to the tag to perform special actions or read data.
- ✓ It is possible to get a record of saved data (***Datalogger***) using *Connected Mode*. This datalogger will contain sensor data saved at a defined period with a timestamp for each data.

3.2. SPECIFIC OPERATION MODES

- **Fast advertising after NFC-field detection**

Starting from firmware version 3.0.0, the tag advertising period will be modified right after you approach an NFC-field to the tag.

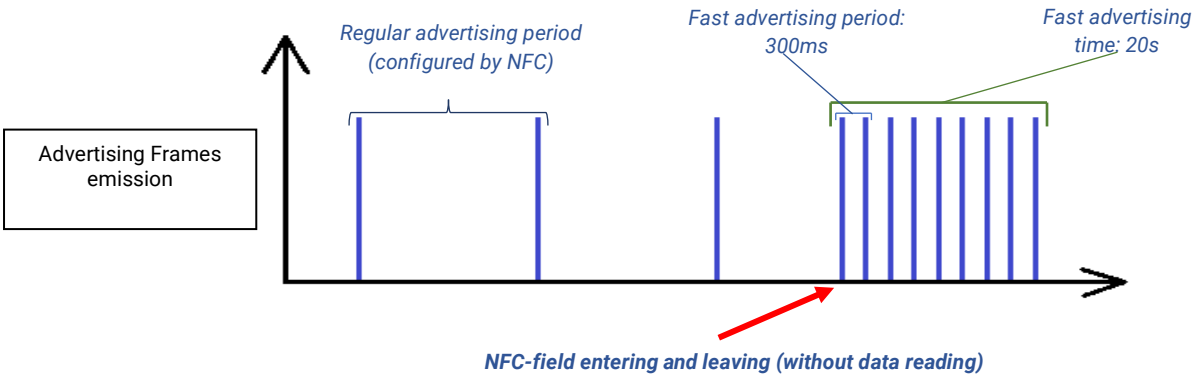


Figure 1 : Fast advertising after NFC Field detection chronograms

After 20 seconds, the advertising period will come back to its normal value if there is not any connection to the tag. There is no need to read the NFC memory to activate this function, any field leaving will trigger it.

This behaviour also happen when the tag reboot, after a reconfiguration for example.

This behaviour can allow easier connection to tags which advertising period is configured with a value greater than 3 seconds.

Note: *The advertising is stopped when the tag is on an NFC-field, thus the advertising will resume right after the tag leave the field.*

- **Long advertising period (FW vers. > 4.0.0)**

For tags with firmware vers. > 4.0.0, standard advertising period above 10 seconds are allowed. However, using such long advertising period makes cumbersome and, in some case, impossible establishing a connexon to the tag. To overcome this issue and for standard advertising period above 20 seconds, null payloads frames are sent during 10 sec and with a period of 1 sec.

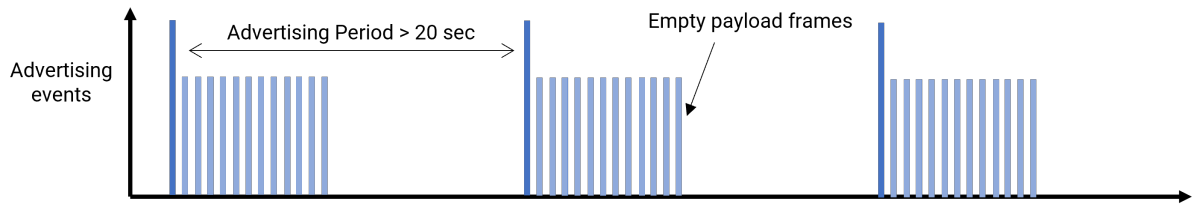


Figure 2 : Long advertising period chronograms

- **Dynamic Advertising periods**

ON EVENT (Legacy)

Tag with formats **MAG**, **MOV**, **PIR** and **DI** and firmware version $< 4.0.0$ version provide the **fast on-event frame functionality**.

- This frame sends data with **faster recurrence** (equal to one tenth of the advertising tag recurrence set in NFC). Data contained in this frame is the same as that contained in the simple advertising frame, but its recurrence varies.

- **Fast frames** appear during a period equal to the advertising period, and with a recurrence equal to one tenth of it. Thus, there are **10 frames**.

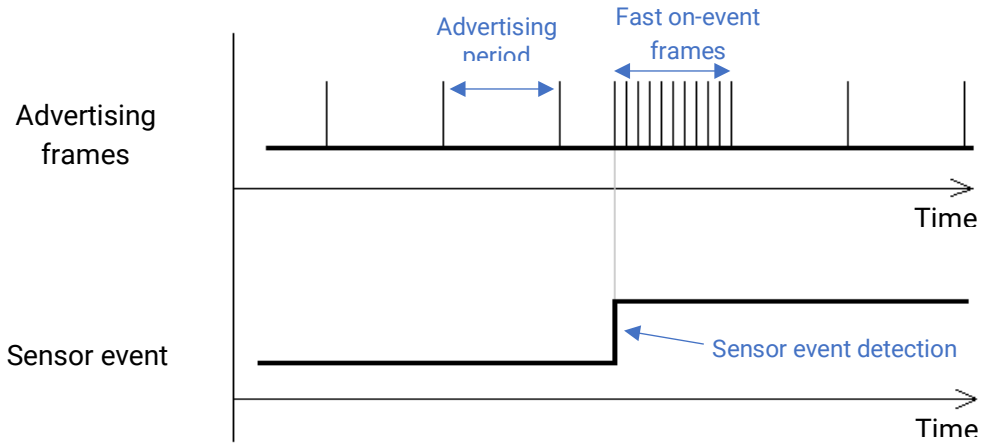


Figure 3 : Fast on-event advertising

These **fast frames** emission takes place at each sensor event:

- For **MAG format**: With each new magnet detection state (present and absent)
- For **MOV format**: At the beginning and end of each movement (depending on the submitted threshold
- For **DI format**: With each new digital input state (logical state 1 or 0)
- For **PIR format**: with each movement detected (sensor state stay at 1 during movement and falls to 0 few seconds after last movement)

In addition to these fast frames, the MAG, MOV and DI formats data also contains an event counter. This counter is incremented at each "rising edge" event detected by the sensor:

- For **MAG format**: With each new magnet detection (magnet present)
- For **MOV format**: At the beginning of each movement (depending on the submitted threshold)
- For **DI format**: With each new logical state 1 of digital input (input shorted)
- For **PIR format**: With each new infrared movement detected

The counter overflow value is 32767 (maximum counter value before reset to zero). The counter resets when a *Connected mode* command ***"RAZ_COUNT"*** is sent, or when the tag reboot.

EXTENDED DYNAMIC ADVERTISING (FW Vers. >4.0.0)

Starting from FW Vers. 4.0.0, *On-event fast advertising is extended to all ELA INNOVATION Tags with sensing capabilities:* ***T, T EN12830, T PROBE, RHT, MOV, ANG, PIR, PROXIR, DI, AI.***

In addition, this functionality is also augmented with the possibility to define more than one sensor threshold plus the possibility to operate either in **burst** or **lasting mode** (see Section 4.3).

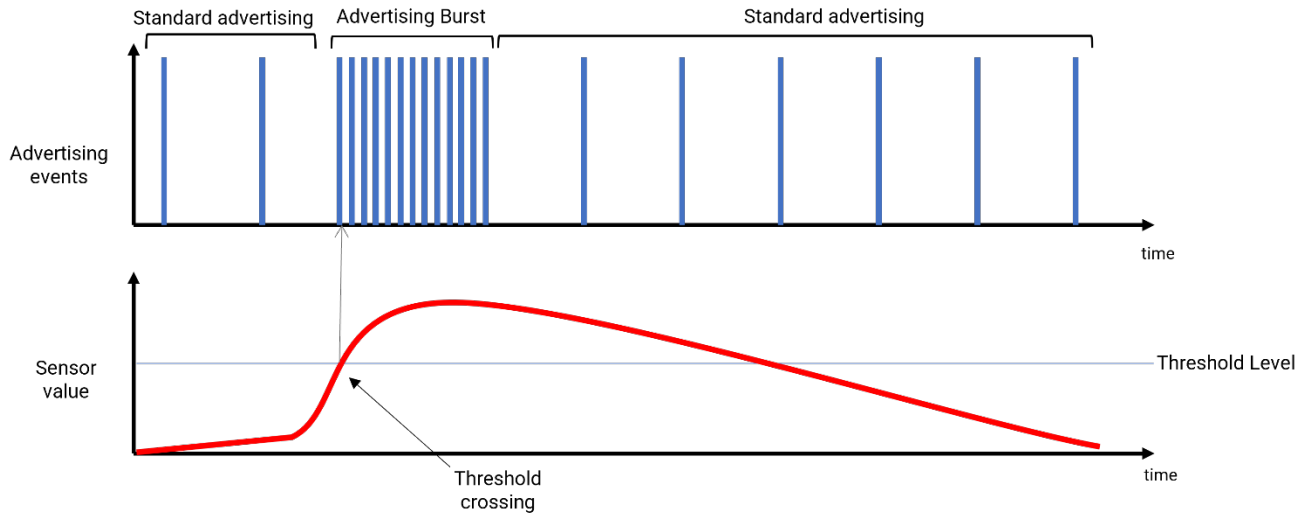


Figure 4 : Advertising chronograms for on-event burst mode

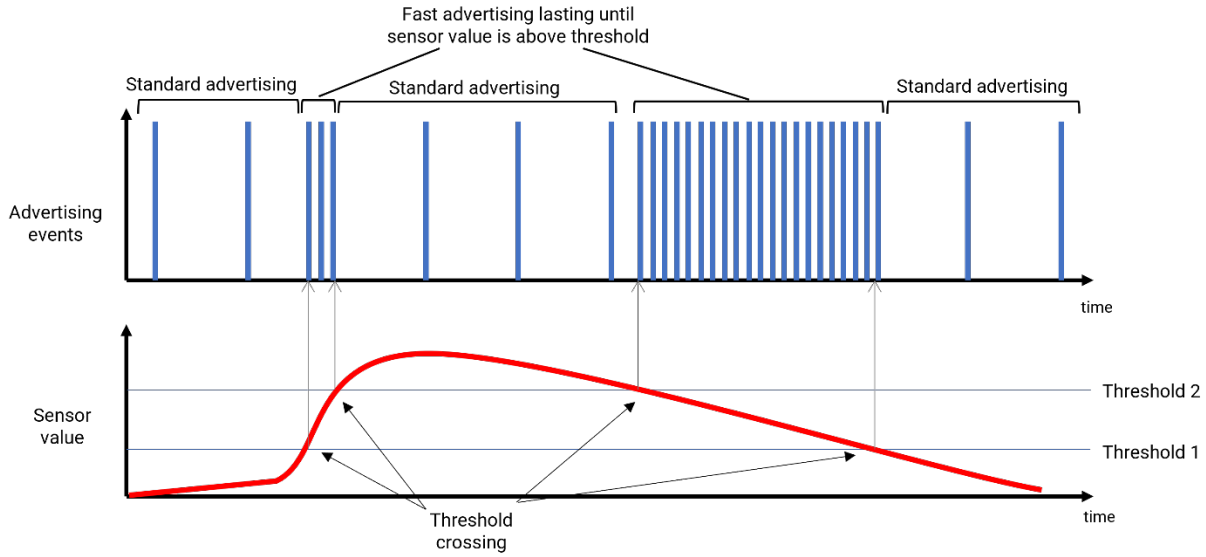


Figure 5 : Advertising chronograms for lasting mode with two threshold

4. ELA INNOVATION BLUE RANGE CONFIGURATION

4.1. GENERALITIES

ELA Innovation BLUE range products are equipped with a NFC chip used for tag configuration. This chip, used with Device Manager suite, allows to write operating parameters, among the following fields:

PARAMETER	*POSSIBLE VALUES*	*ACTION*	*AVAILABILITY*
Name	Maximum 15 characters [0-9 ; A-Z ; a-z ; SPACE, _, -]	Definition of the tag *Name*, transmitted by *Advertising*	Complete *Blue* range
Enable	True / False	*True*: Enable product operation. *False*: Turn OFF the product.	Complete *Blue* range
Power	[-40, -20, -16, -12, -8, -4, 0, +3, +4]	Definition of the product BLE power emission, unit is dBm	Complete *Blue* range
Format	[Id, T, RHT, MAG, MOV, ANG, iBeacon, Eddystone, Analog IN, Digi IN, Digi OUT, PIR, PROXIR]	Definition of Firmware operation	According to product
(Main) Advertising Period	[0.1 -> 10] in s or [100 - 86400000] in ms	Standard duration between two consecutive advertising events	Complete *Blue* range (extended value only available in firmware vers. $\geq 4.0.0$
UUID (iBeacon)	32 characters [0-9 ; A-F]	Definition of iBeacon *UUID*, transmitted by *Advertising*	*Id* products with iBeacon
Major (iBeacon)	4 characters [0-9 ; A-F]	Definition of iBeacon *Major*, transmitted by *Advertising*	*Id* products with iBeacon
Minor (iBeacon)	4 characters [0-9 ; A-F]	Definition of iBeacon *Minor*, transmitted by *Advertising*	*Id* products with iBeacon
NID (Eddystone)	20 characters [0-9 ; A-F]	Definition of the Eddystone *NID*, transmitted by *Advertising*	*Id* products with Eddystone
BID (Eddystone)	12 characters [0-9 ; A-F]	Definition of the Eddystone B*ID*, transmitted by *Advertising*	*Id* products with Eddystone
Measurement period	[100 -> 86400]	Sensor Data acquisition period	*Blue* products with sensors and firmware vers. $\geq 4.0.0$
Data Logger Period	[100 -> 86400]	Definition of the sensor data saving period for *datalogger* feature	*Blue* products with sensors
Data Logger Enable	True / False	*True*: Enable datalogger feature. *False*: Disable datalogger feature.	*Blue* products with sensors
Accerleration threshold	[32 ;8000]	Definition of the acceleration threshold for MOV format, unit is mg	*MOV* products Firmware vers $< 4.0.0$

PIR sensor sensitivity	[0,1,2,3]	*Sensitivity level for the PIR sensor: define the maximum detection distance* *0: 50cm* *1: 1m* *2: 2m* *3 :5m*	*PIR* products with *firmware vers. >3.0.1*
Mfr. Data Enable	True / False	*True*: Enable data transmission in ***Manufacturer Specific Data*** mode. *False*: Enable data transmission in ***Service Data*** mode.	Complete *Blue* range
MFR. ID	12 characters [0-9 ; A-F]	Definition of an hexadecimal identifier used in Id format when ***Manufacturer Specific Data*** are enabled.	Only used in *Id* products
Battery in Scan Response	True/false	*True* : Enable ***Battery voltage transmission into Scan Response*** frame. See related section of this document.	All products with *firmware vers.* ≥ 3.0.0
Advertising period 2	[100 - 86400000] in ms	Duration between two consecutives on sensor event advertising events	*Blue* products with sensors and firmware vers. ≥ 4.0.0
Sensor Threshold 01	[Min Max] of corresponding sensor value with resolution	Sensor threshold for event counter and on-event advertising. Value can be set between min and max sensor value and according to sensor resolution	*Blue* products with sensors and firmware vers. ≥ 4.0.0
Sensor Threshold 02	[Min Max] of corresponding sensor value with resolution	Secondary sensor threshold for on-event advertising. Value can be set between min and max sensor value and according to sensor resolution	*Blue* products with sensors and firmware vers. ≥ 4.0.0
Transmit Mode	[DT0 – DT1 - DT2]	**DT0**: static advertising period **DT1**: enable on-event advertising mode **DT2**: Enable lasting advertising mode	*Blue* products with sensors and firmware vers. ≥ 4.0.0
Burst Duration	[100, 86400000]	Duration of On-event advertising (Transmit Mode = DT1)	*Blue* products with sensors and firmware vers. ≥ 4.0.0
Edge Detect 01	[inf. Threshold, Supp. Threshold, Equal Threshold, Both Threshold]	Definition of threshold crossing rule for of on-event advertising mode	*Blue* products with sensors and firmware vers. ≥ 4.0.0
Edge Detect 02	[[inf. Threshold, Supp. Threshold, Between Threshold, Exclued Threshold	Definition of threshold crossing rule for lasting advertising mode	*Blue* products with sensors and firmware vers. ≥ 4.0.0

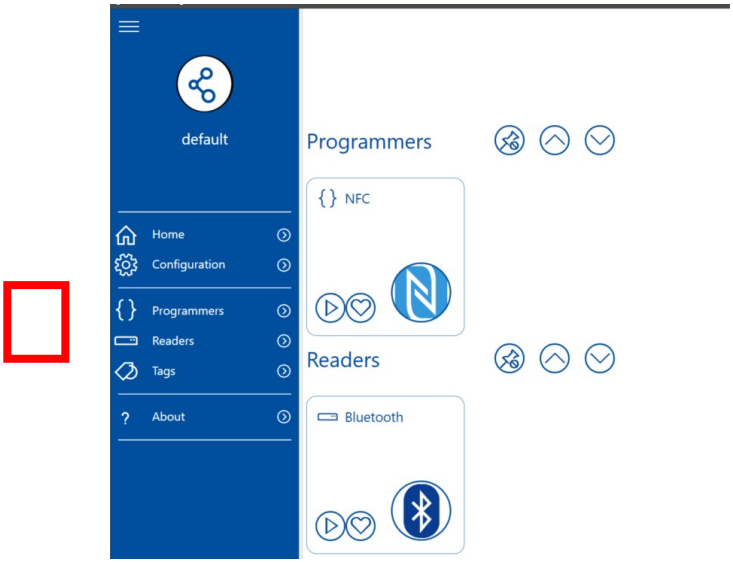
Frame type	[ELA Id, iBeacon, Eddystone, T, RHT, MAG, MOV, ANG, Analog IN, Digi IN, Digi OUT, PIR, PROXIR, Custom]	Definition of BLE data sent	All products with *firmware vers.* ≥ 4.0.0

4.2. BLUE RANGE TAG COFIGURATION WALK-THROUGH EXAMPLES

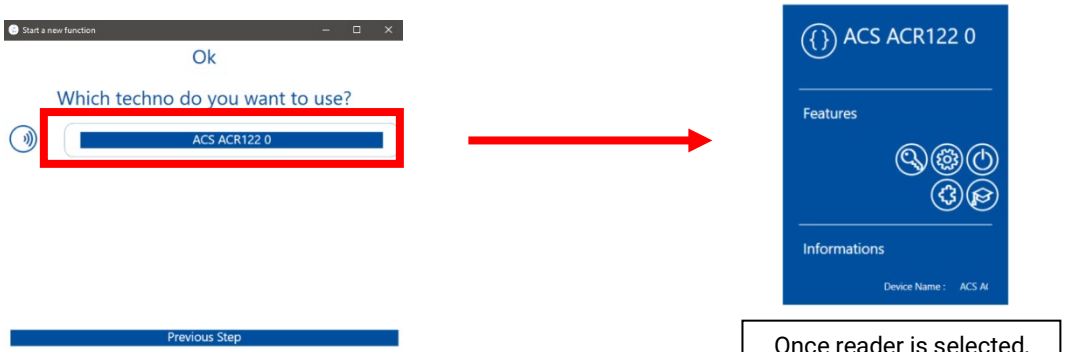
4.2.1. Tag configuration using device manager PC SOFTWARE

1. **Connect a NFC reader** to your desktop (example: NFC R/W 01 - ref. ACIOM177)
2. Start the "**Device Manager**" of your desktop

3. On the welcome main pannel click on the **"PLAY" icon** of the **widget « NFC »**



4. Choose the available **NFC reader** by **clicking** on the button 

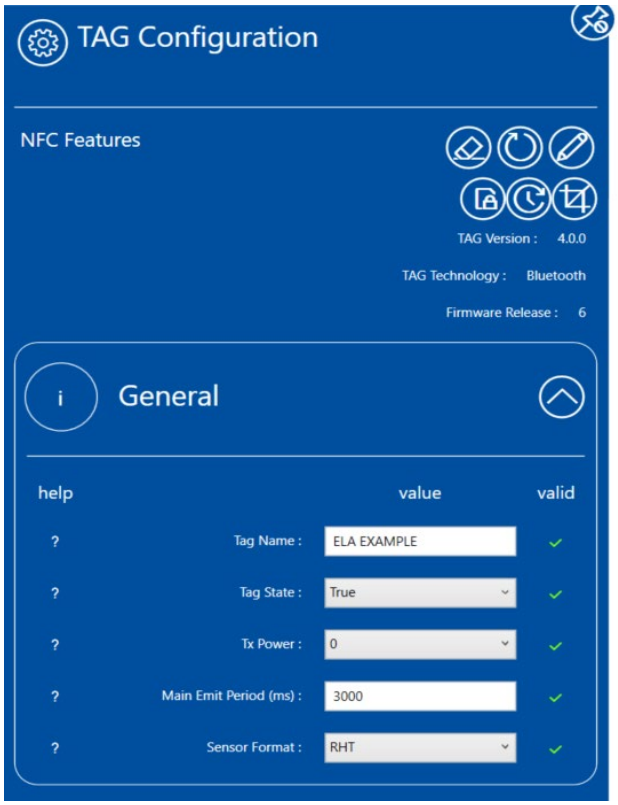


Once reader is selected, this window appears

5. Place the tag on the NFC reader

6. Click on the "***Configuration***" pictogram  to bring up the tag configuration window:

7. Click on « Refresh »  to bring up the current configuration read from the tag.



 Erase setting (default configuration)

 Read and refresh current tag configuration

 Write current configuration to the tag

 Display Tag security option (when applicable)

 Display Data Logger options

 Display calibration options

 Lock / Unlock tag configuration

 Enable / Desable Tag (batch operation)

4.2.2. Tag configuration using a smartphone

4.2.3. Settings Restriction

4.2.3.1. Restriction applying to “Name” field

✓ Name must include **less than or up to 15 characters**

✓ Name **should not contain special characters** (but rather only letters, numbers, spaces, dash - and underscore _).

4.2.3.2. Datalogger restrictions

✓ When the **"Logger Enabled"** field of the NFC settings located under the device manager is **disabled**, the tag reboots and you will **lose all registered data** contained in the data logger.

✓

✓ If you proceed to a **complete re-setting** of the tag by NFC, data **contained in the data logger is erased** from the tag memory.

4.2.3.3. Connected mode restrictions

✓ If the tag is connected to a device and is approached by a NFC field, the tag will disconnect and reboot.

4.2.3.4. Other restrictions

- **iBeacon format**

✓ You must fill in the complete UUID field of the iBeacon format: 32 characters ([0-9]; [A-F]).
✓ You must fill in the complete Major field of the iBeacon format: 4 characters ([0-9]; [A-F]).
✓ You must fill in the complete Minor field of the iBeacon format: 4 characters ([0-9]; [A-F]).

- **Eddystone format**

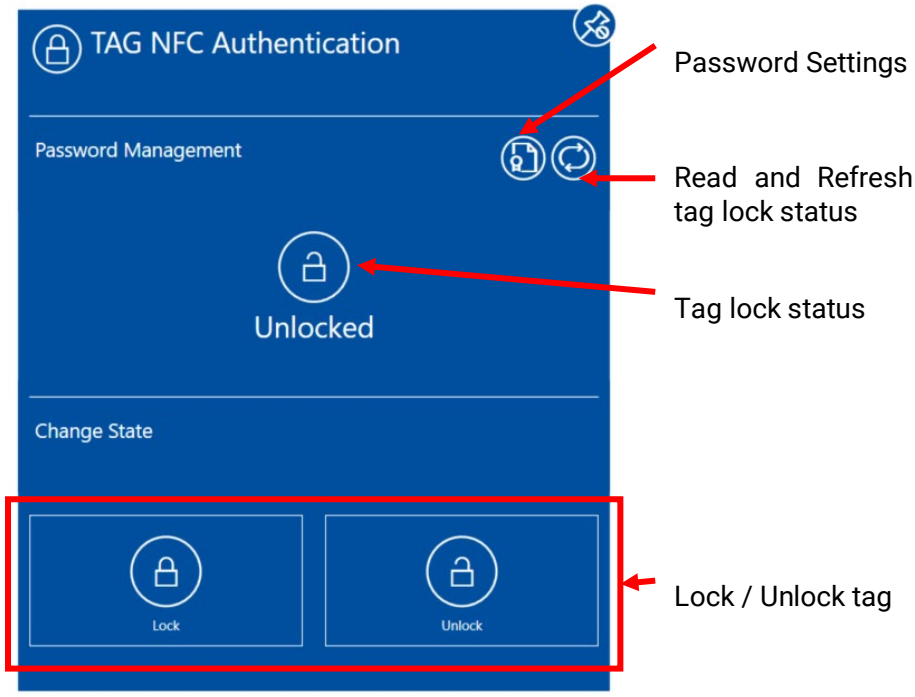
✓ You must fill in the complete NID field of the Eddystone format: 20 characters ([0-9]; [A-F]).
✓ You must fill in the complete BID field of the Eddystone format: 12 characters ([0-9]; [A-F]).

4.3. SPECIFIC CONFIGURATION

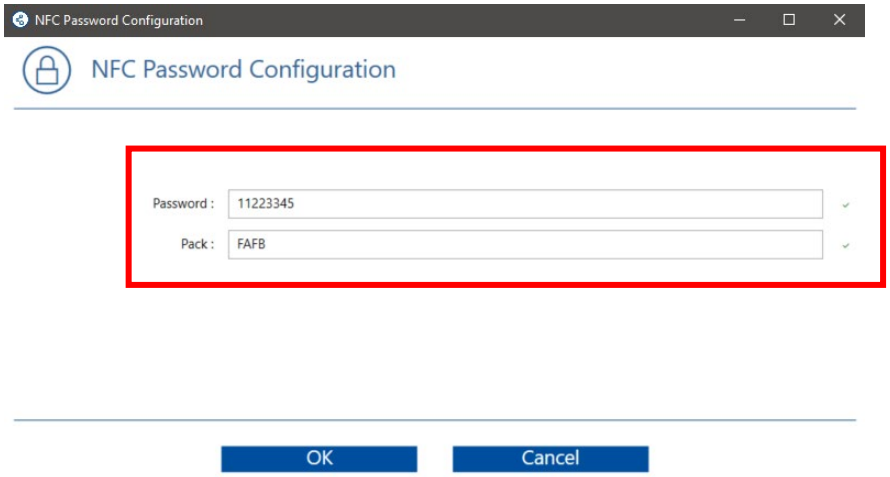
- **TAG NFC CHIP PASSWORD PROTECTION**

Starting from firmware version 2.1.0, it is possible to protect the tags NFC-chip writing by a password. The functionality is accessible on ***Device Manager***, on the ***Programmers*** section:

1. Display the tag authentication window by clicking on the Key pictogram: 



2. Click on **Define password** 



- NFC password must have exactly **8 hexadecimal characters.**
- Pack NFC validate the authentication of the tag but has no consequence on the password modification. It is recommended to leave it to its defaults value: 0x***FAFB***.

Note: It is not possible to recover a lost password. If you forgot your password, it will be necessary to return the product to ELA Innovation.

3. Click on **Update state**  to read the current lock status of the tag (locked / unlocked)

Into the ***Change State*** area, the transition from a *Lock/Unlock* or *Unlock/Lock* state is done by clicking on the ***Lock*** or ***Unlock*** icons:

Note: If the password set in step 2. Is not correct, the Unlock command will have no effect on the tag.

- **TEMPERATURE CALIBRATION NFC CONFIGURATION**

Starting from firmware version 3.0.0, it is possible to configure a 2nd-polynomial calibration that can be used to correct temperature sensor value, to adjust measurement precision.

General Information

Calibration uses a 2nd order polynomial correction formula aT^2+bT+c, where ***a***, ***b*** and ***c*** are configurable coefficients (T being the original temperature value measured by the sensor). These coefficients **can only be written via NFC and read in *connected mode***.

They are transmitted in the format ***X***e***Y***, where ***X*** is an integer between 32768 and 32767, followed by a exponent ***Y*** from -128 to 127. ***X***e***Y*** is equivalent to X.10^Y. Examples:

- 125e-5 = 0.00125
- 1e-2 = 0.01
- 12e-1 = 1.2

Examples of complete calibration procedure:

✓ Sensor reading before calibration = 25.00°C. Calibration polynomial [c, b, a]: [5e-1, 1e0, 0e0]. The corrected value is therefore: T_{cal} = 25.5°C

✓ Sensor reading before calibration = 25.00°C. Calibration polynomial [c, b, a]: [0e0, 101e-2, 0e0]. The corrected value is therefore: T_{cal} = 25.25°C

Enabling / disabling sensor value connection **can only be done via NFC**.

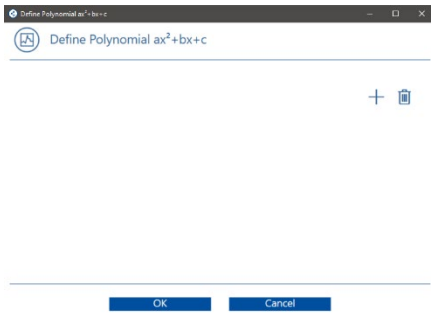
NFC Configuration

The fields for calibration and the calibration report are configured using the Device Manager application.

The window for configuring the fields is accessible via the "***Calibration***" icon. 

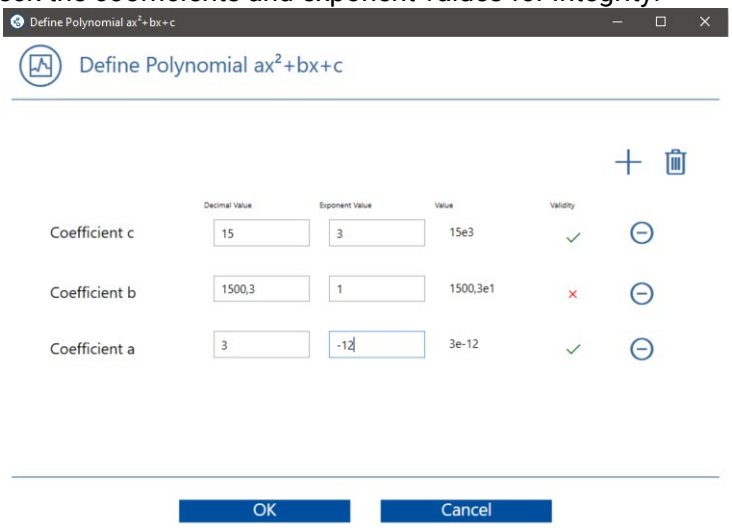
Here you can enable the calibration and also configure polynomial coefficients.

Click on the  button to pop the Polynomial value configuration window :

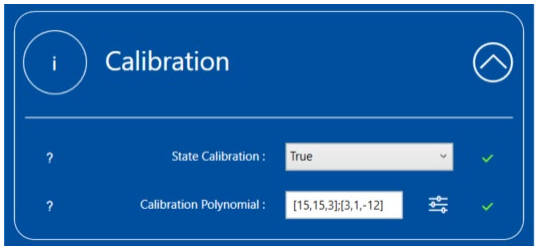


You can add a calibration coefficient by clicking on the button. 

The window will check the coefficients and exponent values for integrity.



Click on ***OK*** when the values are set. They will appear on the previous window:



Do not forget to write the NFC configuration to the tag. 

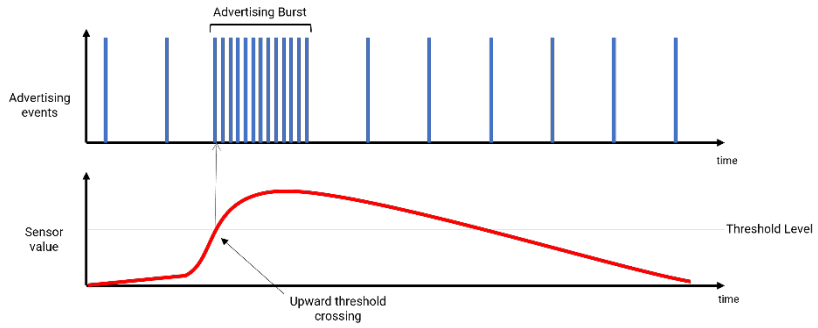
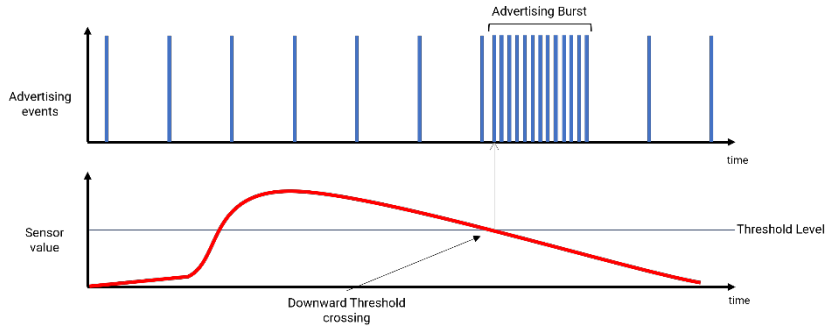
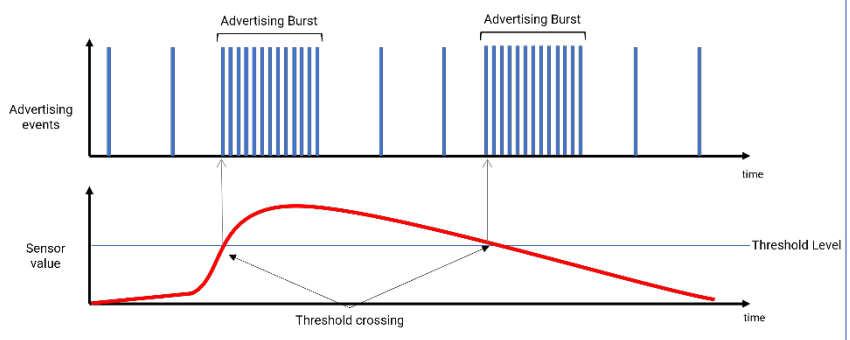
- **DYNAMIC ADVERTISING CONFIGURATION (FW vers. > V4.0.0)**

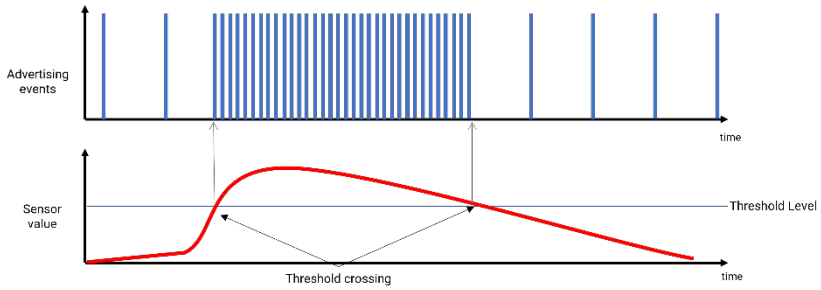
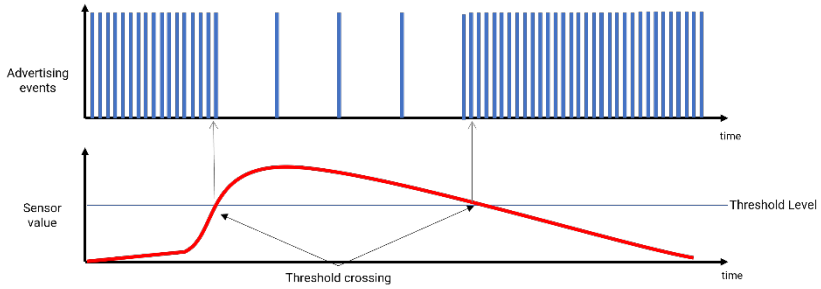
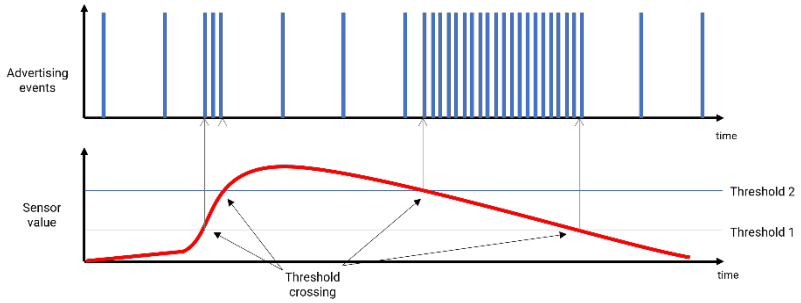
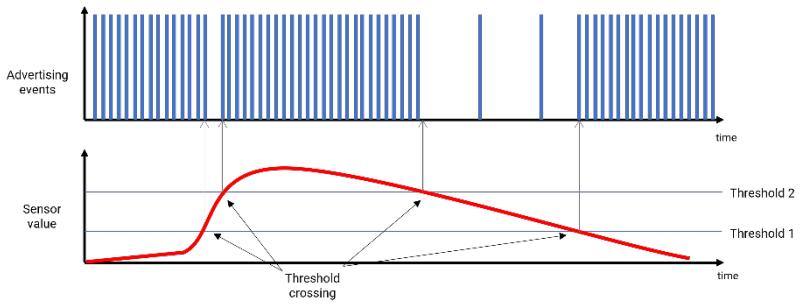
Starting from firmware version 4.0.0, it is possible to configure 2 advertising periods and define transition rules according to sensor value.

General Information

Two dynamic advertising are defined: On-event mode (DT1) and lasting mode (DT2). In on-event mode each time the sensor value crosses a configurable threshold value an advertising burst of configurable duration and with the advertising period 2, is emitted. In lasting mode, the advertising period 2 is used until the sensor value is above or below a threshold or between or outside an interval define by two thresholds.

Following table gives advertising chronograms for the different configured transition rules

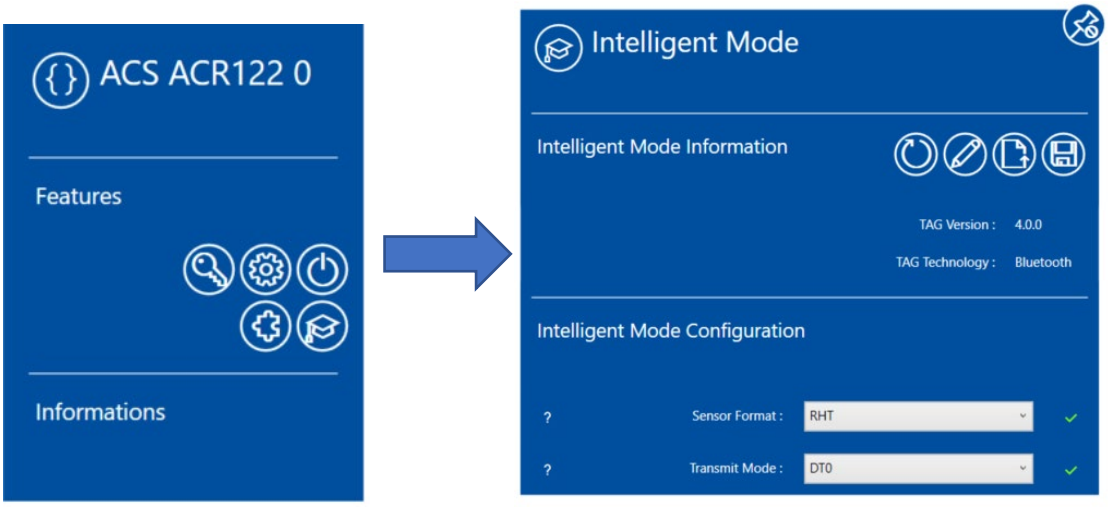
	Sensor value crossing direction (Edge detect 01)	
On Event Mode (DT1)	Upward (Inf. Threshold)	
	Downward (Supp. Threshold)	
	Upward & downward (both Threshold)	

Lasting Mode (DT2)	**Sensor value with respect to threshold (Edge detect 02)**	
	Above (Supp. Threshold)	
	Below (Inf. Threshold)	
	Between (Between threshold)	
	Outside (Exclude threshold)	

NFC Configuration

The second advertising period, dynamic advertising mode, threshold level and sensor signal to considered can be configured using Device Manager.

The window for configuring the fields is accessible via the "***Intelligent Mode***" icon. 



1. Click on the  incon to read and refresh intelligent mode configuration
2. Select the desired sensor format and transmit mode (DT0: static advertising, DT1: On-event mode, DT2: Lasting mode
3. Select the desired sensor value signal to consider and set the second advertising period
4. Select the sensor value crossing crossing direction (Edge detect 01) or the sensor value condition with respect to threshold
5. Set thresholds values (and burst duration for on-event mode only)
6. Click the  icon to write the current configuration to the tag

5. FRAME FORMAT AND CONTENT

5.1. GENERALITIES

BLE protocol fixes the length of BLE packets to 47 Bytes maximum among which a maximum of 37 are define by the user and are generally referred as the **payload**.

In this payload, the 6 first bytes are reserved for the advertiser address (mac address), the following 3 are used to flag the type of advertising frame and the 29 remaining contains actual datas of interest. Identification of the data types can follow "**Service Data"** identification standardized by BLE specification or can be customs using "**Manufacturer Specific Data**" types.

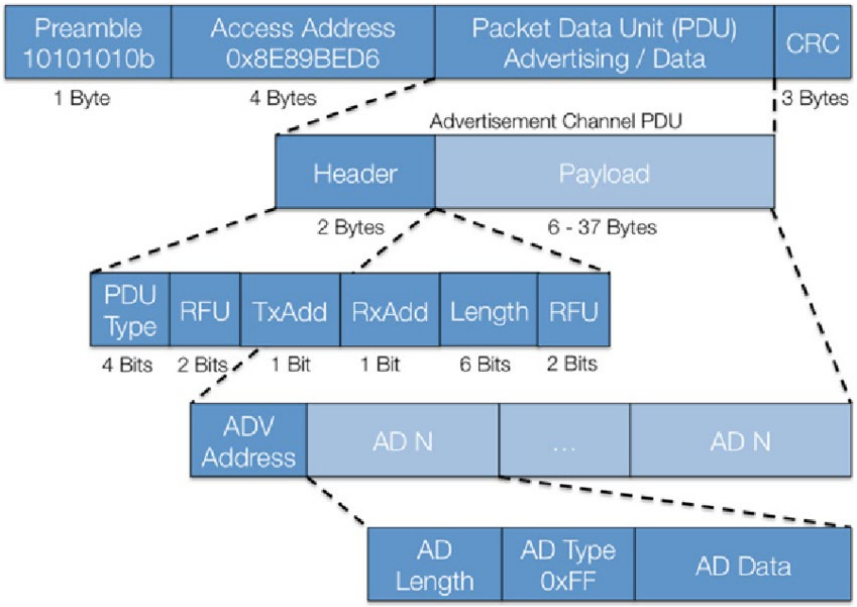


Figure 6 : Advertising frame format as per BLE SIG specifications

In Firmware version $< 4.0.0$, several pre-defined frame formats are available to the user (legacy frame format) depending on the configured tag format. Such frame are described in detail in the *BLE frame specification* document available on ELA website. "**Service Data**" type identification is used as a standard for interoperability with generic BLE scanner but **"Manufacturer Specific data"** type identification frame format are also available.

In Firmware version $\geq 4.0.0$, fully customized frame format are also available on demand, legacy frame format being available by default. In these custom frame formats the value / data of each byte can be specified by the user and configured at ELA Innovation factory.

5.2. SENSOR DATA IN "SERVICE DATA" FRAME (Legacy)

- « T », « T EN » and « T Probe » formats example:

Raw data:
0x020106051 66E2AAB0A1009425055434B5354 3830304131324E41

0x6E2A : *Temperature* service

T° data:
- 0xAB : LSB
- 0x0A : MSB

T° = 0AAB = 2731 * 0.01 = 27.31°C

Details :

LEN.	TYPE	VALUE
2	0x01	0x06
5	0x16	0x6E2AAB0A
10	0x09	0x425055434B53543830304131324E41

Name (ASCII)

Note: For a negative temperature, data is sent in 2-complement: for example, -27.31°C is 6E2A55F5

- « MAG » format example:

Raw data:
0x020106051 6062AFB0A1009425055434B535438 30304131324E41

0x062A : *Alert Status* service

MAG data:
- 0xFB : LSB
- 0x0A : MSB

Hexa.	0	A	F	B
Binary	0000	1010	1111	1011

⇨ 1: instantaneous sensor state (magnet present)
⇨ 1010 1111 101: event counter value on 15 bits, 1405 in this example

Details :

LEN.	TYPE	VALUE
2	0x01	0x06
5	0x16	0x062AFB0A
11	0x09	0x425055434B53543830304131324E41

Name (ASCII)

- MOV » format example:

Raw data:
0x020106051 6062AFB0A1009425055434B5354 3830304131324E41

0x062A : *Alert Status* service

MOV data:
- 0xFB : LSB
- 0x0A : MSB

Hexa.	0	A	F	B
Binary	0000	1010	1111	1011

⇨ 1 : instantaneous sensor state (movement detection)
⇨ 1010 1111 101 : event counter value on 15 bits, 1405 in this example

Details :

LEN.	TYPE	VALUE
2	0x01	0x06
5	0x16	0x062AFB0A
11	0x09	0x425055434B53543830304131324E41

Name (ASCII)

5.3. SENSOR DATA IN "MANUFACTURER SPECIFIC DATA" FRAME (Legacy)

1) ELA Innovation *Company Identifier* (*CIN*) is 0x0757.

2) In *ELA_ID* and *Digi OUT* formats, it is possible to configure a hexadecimal number (max. 0xFFFFFFFFFFFF) which will be sent in advertising frame. This field is named "***Manufacturer Data ID***" in the NFC configuration. This number is called "MFR_ID" in this document frame formats.

In « *Manufacturer Specific Data* », sensor data are encoded the same way as in "Service Data" mode, only the "data type" in hexadecimal is modified:

- 0x16: for « ***Service data*** »
- 0xFF: for « ***Manufacturer Specific Data*** »

Manufacturer Specific Data are transmitted as follows:

ELA CIN	DataInfo	Data

Here is an example with a « T » format frame:

Raw data:
0x02010606FF5707124D0A0B09425055434B
535438303041313 24E41

Details :

LEN.	TYPE	VALUE
2	0x01	0x06
5	0xFF	0x5707124D0A
11	0x09	0x425055434B535438303041313 24E41

Name (ASCII)

0x5707 => **ELA CIN** : ELA Innovation *Company Identifier number*
- 0x07 : LSB
- 0x57 : MSB

Soit 0x**0757**.

0x12 : DataInfo : Indicate the following data : Temperature data here

Data : T° data:
- 0x4D : LSB
- 0x0A : MSB

T° = 0A4D = 2637 * 0.01 = 26.37°C

All sensor data are listed in the table below:

Field		Length	Description
Temperature data (T)	DataInfo	1 byte	0x12 (bit7-4=1 et bit3-0=2)
	Data	2 bytes	Temperature on 16 signed bits / 0,01°C step
Humidity data (RH)	DataInfo	1 byte	0x21 (bit7-4=2 and bit3-0=1): Relative Humidity
	Data	1 byte	Humidity on 8 unsigned bits / 1 % step RH de 0 à 100 %
Magnetic data (MAG)	DataInfo	1 byte	0x32 (bit7-4=3 and bit3-0=2)
	Data	2 bytes	Event (state change) counter on the 15 (unsigned) MSB Instantaneous state on LSB
Movement data (MOV)	DataInfo	1 byte	0x42 (bit7-4=4 and bit3-0=2)
	Data	2 bytes	Event counter (threshold overflow) on the 15 (unsigned) MSB Instantaneous state on LSB
Infrared movement data (PIR)	DataInfo	1 byte	0x92 (bit7-4=9 and bit3-0=2)
	Data	2 bytes	Event (infrared movement detected) counter on the 15 (unsigned) MSB Instantaneous state on LSB
Accelerometer data (ANG)	DataInfo	1 byte	0x56 (bit7-4=5 and bit3-0=6)
	Data	6 bytes	X-axis acceleration on 16 signed bits (range +/-2G) Y-axis acceleration on 16 signed bits (range +/-2G) Z-axis acceleration on 16 signed bits (range +/-2G)
Digital Input data (DI)	DataInfo	1 byte	0x62 (bit7-4=6 and bit3-0=2)
	Data	2 bytes	Event (input state change) counter on the 15 (unsigned) MSB Instantaneous input state on LSB
Analog Input data (AI)	DataInfo	1 byte	0x72 (bit7-4=7 and bit3-0=2)
	Data	2 bytes	Voltage measured in mV on 16 unsigned bits

Identifiers format data (*Id* and *DO*) offer to transmit an identifier configured by NFC:

***Id* format data**	DataInfo	1 byte	0x06 (bit7-4=0 and bit3-0=6)
	Data	6 bytes	*MFR_ID* configured by NFC
Digital output data (*DO*)	DataInfo	1 byte	0x86 (bit7-4=8 and bit3-0=6)
	Data	6 bytes	*MFR_ID* configured by NFC

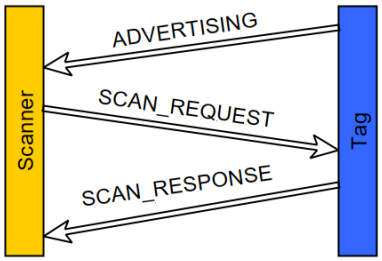
5.4. *SCAN RESPONSE FRAME (legacy)*

In some formats and versions, the tag can send a frame called « Scan Response frame ».

Once an advertising packet has been received by a scanner, further information can be requested. Then the tag responds with the "scan response" frame.

This frame is located right after the advertising frame, and contains different data depending on the version and format.

The data sent in "Scan response" frame is also formatted either in Service mode or in Manufacturer Specific mode.



5.5. BATTERY INFORMATION (legacy)

Battery capacity

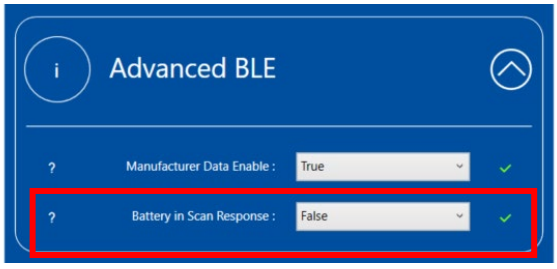
ELA Innovation's tags are based on the transmission of battery information in the Scan Response when the capacity of the battery falls below 15%. The formatting of the information is as follows:

Frame type		Service Data	Service Data	Mfr. Spec. Data
Version		1.0.0, 2.0.0, 2.1.x	≥2.2.0	≥2.0.0
Transmission		Batt. capacity < 15%	Batt. capacity < 15%	Batt. capacity < 15%
Frame bytes	1	Length : 0x04	Length: 0x04	Length : 0x05
	2	Type : 0x16	Type : 0x16	Type : 0xFF
	3	Battery Serv. LSB : 0x0F	Battery Serv. LSB : 0x19	ELA_CIN_LSB : 0x57
	4	Battery Serv. MSB : 0x18	Battery Serv. MSB : 0x2A	ELA_CIN_MSB: 0x07
	5	Batt. data (%)	Batt. data (%)	BATT_DATA_ID: 0xF1
	6	Not used	Not used	Batt. data (%)
	7	Not used	Not used	Not used

Battery voltage

From version 3.0.0 onwards, it is possible to transmit battery voltage information for all formats. For this purpose, the "**Battery voltage presence**" option must be configured in the NFC memory.

When the option is activated, the tag no longer transmits battery capacity information below 15%.



Once the option is enabled, the battery voltage information is transmitted in the "Scan Response" frame with the following formatting:

Frame type		All
Version		≥3.0.0
Transmission		Battery voltage presence = 1
Frame Bytes	1	Length : 0x06
	2	Type : 0xFF
	3	ELA_CIN_LSB : 0x57
	4	ELA_CIN_MSB: 0x07
	5	BATT_DATA_ID: 0xF2
	6	Batt. voltage (mV) LSB
	7	Batt. voltage (mV) MSB

Frame examples showing battery information:

Received frame: ELA ID, Service Data, v3.0.0 Battery voltage presence = 0		***Received frame: ELA T, MFR Spec. Data, v3.0.0 Battery voltage presence = 0***	
Name	*BE_BATTERY*	***Name***	*BE_BATTERY*
		Measured temp.	*27.12°C (0x0A98)*
Battery cap.	*13% (0x0D)*	***Battery cap***	*13% (0x0D)*

Raw data:

0x0201060B0942455F424154544552590416192A0D

Details:

LEN.	TYPE	VALUE
2	0x01	0x06
11	0x09	0x42455F42415454455259
4	0x16	0x192A0D

T° Data

Name

Battery cap. (SR Frame)

Raw data:

0x02010606FF570712980A0B0942455F4241545445525905FF5707F10D

Details:

LEN.	TYPE	VALUE
2	0x01	0x06
6	0xFF	0x570712980A
11	0x09	0x42455F42415454455259
5	0xFF	0x5707F10D

In Eddystone and iBeacon formats, the battery information is located before the Tag Name :

Received frame : iBeacon, v2.1.0		***Received frame: Eddystone, v3.0.0 Battery voltage presence = 0***	
Name	*BE_BATTERY*	***Name***	*BE_BATTERY*
Battery cap.	*13% (0x0D)*	***Battery cap.***	*13% (0x0D)*

Raw data:

0x0201061AFF4C000215010203040506070809 0A0B0C0D0E0F10020B010AC4041 60F180D0B0942455F42415454455259

Details:

LEN.	TYPE	VALUE
2	0x01	0x06
26	0xFF	0x4C000215010203040506070809 0A0B0C0D0E0F10020B010AC4
4	0x16	0x0F180D
11	0x09	0x42455F42415454455259

iBeacon field

Eddystone field

Battery cap. (SR

Name (SR

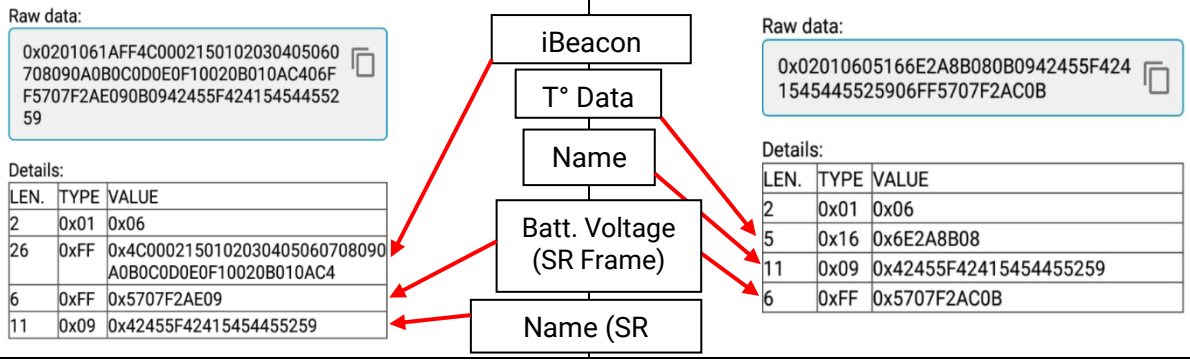
Raw data:

0x0201060303AAFE1716AAFE00ED01020304050607080 90A010203040A0B000004 16192A0D0B0942455F42415454455259

Details:

LEN.	TYPE	VALUE
2	0x01	0x06
3	0x03	0xAAFE
23	0x16	0xAAFE00ED010203040506070809 0A010203040A0B0000
4	0x16	0x192A0D
11	0x09	0x42455F42415454455259

Received frame: iBeacon, v3.0.0 *Battery voltage presence = 1*		*Received frame: ELA T, Service Data, v3.0.0* *Battery voltage presence = 1*	
Name	*BE_BATTERY*	***Name***	*BE_BATTERY*
		Measured temp	*21.87°C (0x088B)*
Batt. voltage	*2.478V (0x09AE)*	***Batt. voltage***	*2.988 V (0x0BAC)*



5.6. INFORMATION ABOUT IBEACON, EDDYSTONE

iBeacon

- Tags settings available in iBeacon format
- Compliance with Apple specific data such as:

  Flags – Length – Type - Company ID - Beacon Type - Proximity UUID - Major - Minor

- You can add an additional "Name", which is send it in the "Scan Response" BLE frame and configure it in the "Name" field from the Device Manager
- Specification: https://developer.apple.com/ibeacon/

Eddystone

- Tags settings available in Eddystone UID format
- Compliance with specific Google Data Eddystone UID format such as:

  A unique, static ID with a 10-byte Namespace component and a 6-byte Instance component

- You may add an additional "Name", which is send in the "Scan Response" BLE frame and configure it in the "Name" field
- Specification: https://developers.google.com/beacons/overview

5.7. CUSTOM FRAME FORMAT

- **Specification Rules**

Firmware version $\geq 4.0.0$ offers the possibility to customize entirely the frame format of the advertising and scan response payloads. The custom frame format are defined during the tag production and will be remain identical all over the operation of the tag.

Custom frame format specification follow the following rules:

- Frames are split in blocks that in turns, define the value of several bytes. A maximum of 5 blocks can be defined for each of the Advertising and Scan Response frame.

- Blocks are ordered which means that the bytes defined by the first block will be on the most significant side, the bytes defined by the second block will follow and so on.

- Block can be conditional which means that a block can be included in the payload only if a condition on sensor data is verified. A maximum of 2 conditional blocks per frame can be defined. For each conditions, the block can be defined when the condition is valid or invalid.

- If the sum of the number of bytes over all blocks must not exceed 28 - number of blocks, extra bytes are discarded

- Bloc type must be defined among the list of table 1

- Data included in a block can be of following types (table 1)

    - A static hexadecimal value (table 1)
    - Sensor data (table 1)

- Sensor value can be specifically rescaled and formatted (table 1)

Bloc type	Conditions	Data type			Scaling	Data format
		hex	Local naming	Sensor		
Incomplete List of UUID16	Always present	CIN_UUID1	NAME	T	X1000	uint8
Complete List of UUID16	Strictly inferior		MFR_ID	RH	X100	int8
Incomplete List of UUID32	Strictly superior		Eddystone NID	MAG (cpt + état)	X10	uint16 LSB
Complete List of UUID32	Equal to		Eddystone BID	MOV (cpt + état)	X1	uint16 MSB
Incomplete List of UUID128	In between		iBeacon UUID	ACC_X	/10	int16 LSB
Complete List of UUID128	Outside		iBeacon MAJOR	ACC_Y	/100	int16 MSB
Shortened Local Name			iBeacon MINOR	ACC_Z	/1000	uint32 [0-7]
Complete Local Name				DI (cpt + état)		uint32 [8-15]
TX Power level				AI		uint32 [16-23]
Solicited list of UUID16				PIR (cpt + état)		uint32 [24-31]
Solicited list of UUID128				CHOC		int32 [0-7]
Service Data 16				Tension pile		int32 [8-15]
Service Data 32				Capacité pile (%)		int32 [16-23]
Service Data 128				Puissance TX à 0m		int32 [24-31]
Manufacturer Specific Data				Puissance TX à 1m		FP32 [0-7]
				Compteur MAG		FP32 [8-15]
				Etat MAG		FP32 [16-23]
				Compteur MOV		FP32 [24-31]
				Etat MOV		FP24 [0-7]
				Compteur DI		FP24 [8-15]
				Etat DI		FP24 [16-23]
				Compteur PIR		
				Etat PIR		
				Puissance TX brute		
				Touch (cpt + état)		
				Compteur TOUCH		
				Etat TOUCH		
				Distance (PROXIR)		

- **Examples**

Temperature sensor data with standard “Service data” type with constant ASCII string as “complete local name”

In this first example, the advertising frame is specified as follow:

N° Block	Conditionality	Type	N° Byte within block	Data type and scaling	Value or data format
1	Always present	Service data 16	1	Static value	6E
			2		2A
			3	Sensor T x100	In16 LSB
			4		Int16 MSB
2	Always present	Complete local name	1	Static value	E
			2		L
			3		A
			4		(space)
			5		I
			6		N
			7		N
			8		O
			9		V
			10		A
			11		T
			12		I
			13		O
			14		N

As a result the advertising payload will be the following (27°C):

Raw data:
0x02010605166E2AAB0A0F09454C4120494E4E4F564154494F4E

Details :

LEN.	TYPE	VALUE
2	0x01	0x06
5	0x16	0x6E2AAB0A
11	0x09	0x454C4120494E4E4F564154494F4E

0x6E2A : *Temperature* service

T° data:
- 0xAB : LSB
- 0x0A : MSB

T° = 0AAB = 2731 * 0.01 = 27.31°C

Name (ASCII) : ELA INNOVATION

Note: For a negative temperature, data is sent in 2-complement: for example, -27.31°C is 6E2A55F5

Magnetic sensor data with "Manufacturer Specific data" data type (ELA specific), name with "service data type" and conditional name block

In this first example, the advertising frame is specified as follow:

N° Block	Conditionality	Type	Length	N° Byte	Data type	Value / format
1	Always present	Manufacturer data	5	1	Static value	57
				2		07
				3	Static value	32
				4	Sensor MAG (Event + counter)	In16 LSB
				5		Int16 MSB
2	Conditional MAG State value =1	Complete local name	5	1	Static value	C
				2		L
				3		O
				4		S
				5		E
	Complementary (MAG State value = 0)	Complete local name	4	1	Static Value	O
				2		P
				3		E
				4		N

As a result the advertising payload will be the following:

Case 1: The magnetic sensor detect a magnetic field

Raw data:

0x020106**06**FF**570732**FB0A**06**09434c4f5345

Details :

LEN.	TYPE	VALUE
2	0x01	0x06
5	0xFF	0x570732FB0A
6	0x09	0x434c4f5345

CLOSE (ASCII)

0x5707 : *ELA Innovation* Compagny Identifier
0x32 : *Magnetic sensor data* (ELA Mfr Specific data type
MAG data:
- 0xFB : LSB
- 0x0A : MSB

Hexa.	0	A	F	B
Binary	0000	1010	1111	1011

⇨ 1: instantaneous sensor state (magnet present)
⇨ 1010 1111 101: event counter value on 15 bits, 1405 in this example

Case 2: The magnetic sensor detects a magnetic field

Raw data:

0x020106**06**FF**570732**FA0A**05**094f50454e

Details :

LEN.	TYPE	VALUE
2	0x01	0x06
5	0xFF	0x570732FA0A
5	0x09	0x4f50454e

OPEN (ASCII)

0x5707 : *ELA Innovation* Compagny Identifier
0x32 : *Magnetic sensor data* (ELA Mfr Specific data type
MAG data:
- 0xFA : LSB
- 0x0A : MSB

Hexa.	0	A	F	A
Binary	0000	1010	1111	1010

⇨ 0: instantaneous sensor state (magnet present)
⇨ 1010 1111 101: event counter value on

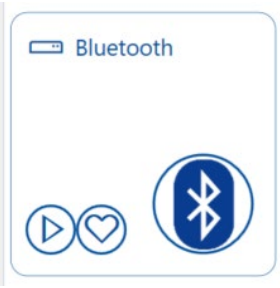
5.8. DATA VIZUALISATION USING DEVICE MANAGER

The ELA Innovation *Device Manager* application can perform BLE scans in order to view advertising data from BLE ELA Innovation products:

1. Enable internal Bluetooth or connect a Bluetooth device (typ. Dongle) to your PC

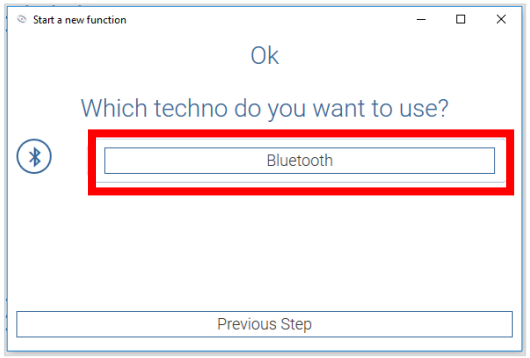
2. Launch the "**Device Manager**" desktop application

3. Start the **"Bluetooth" widget** by clicking button



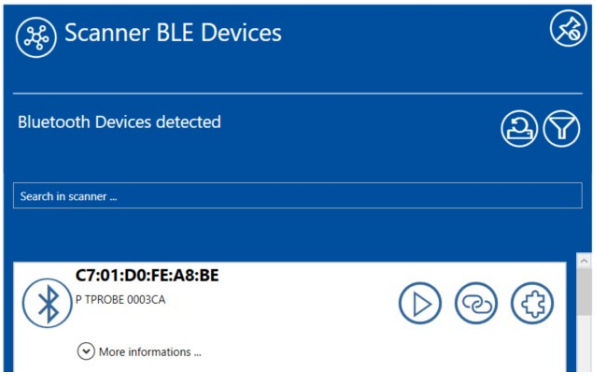
4. Start the **BLE device search**

5. Click on the found device. The ***Bluetooth*** windows appears

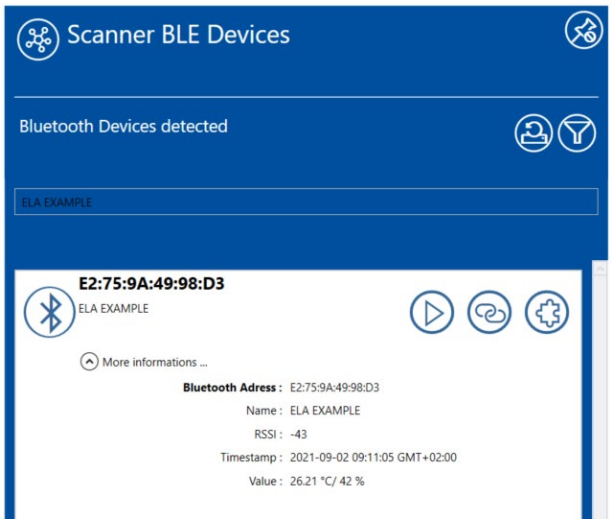


Once reader has been chosen, this window appears

6. Start the ***BLE Device scanner***



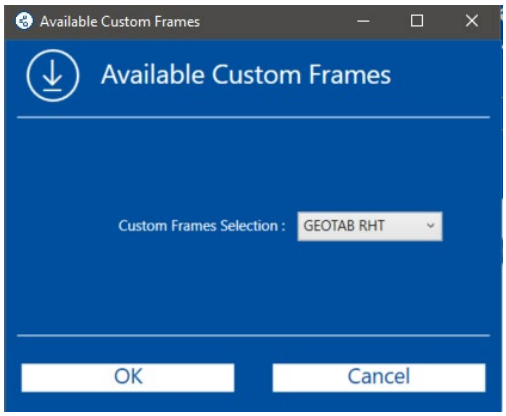
On this window, it is possible to search for a Name or MAC Address from the entire drop-down list (see next page)



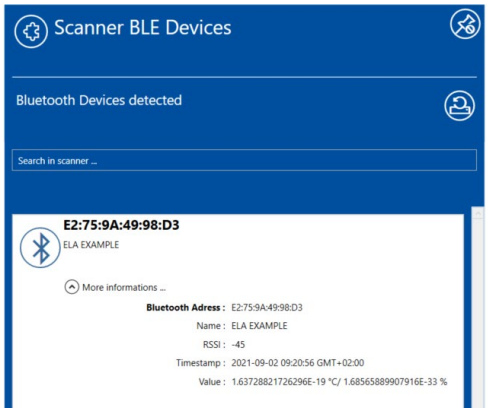
Tag name filtered
« More information » field extended
Right click: copy device name or mac address

For tag with frame format other than ELA, IBeacon and Eddystone, decoded payload information can be maid accessible by clicking the  icon.

Select the predefine frame format:

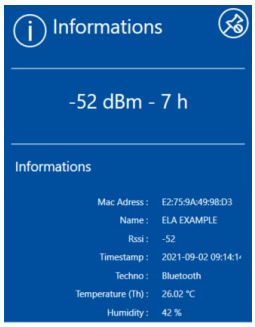


The corresponding tag info are now decoded according to this frame format:



7. Click on the ***Tag info visualization***  button. This window opens:

8. It is possible to view the tag data with the Information button.  This opens a window displaying tag Name, RSSI and MAC address, and sensor info:



6. CONNECTED MODE OPERATION

In "***Connected Mode***", a link is established between two devices and only they can communicate and exchange with each other. You may establish a connection using a smartphone or a mobile application, or with a PC equipped with the ELA "*Device Manager*" application (provided you activated Bluetooth or connected a BLE dongle to the PC).

- The *Advertising Recurrence* must be less than or equal to 3 seconds to be able to establish a connection.
- Once you enter "*Connected Mode*", "***Advertising***" **is stopped by default**.
- It is possible to send commands to the tag to perform special actions or read data.

It is possible to get a record of saved data (***Datalogger***) using *Connected Mode*. This datalogger will contain sensor data saved at a defined period with a timestamp for each data

6.1. *CONNECTED MODE LIST OF COMMAND*

COMMANDS	***ACTIONS***	***MINIMUM FIRMWARE VERSION***
LED_ON	Turn ON the LED (infinite Blink)	**≥1.0.0**
LED_OFF	Turn OFF the LED	**≥1.0.0**
LED_ON XX	Turn ON the LED (for XX seconds)	**≥2.0.0**
BUZZ_ON	Turn ON the buzzer (Repeated beep)	**≥1.0.0**
BUZZ_OFF	Turn OFF the buzzer	**≥1.0.0**
BUZZ_ON XX	Turn ON the buzzer (for XX seconds)	**≥2.0.0**
DIGI_ON	Turn Digital Output to "ON" state	**≥2.1.0**
DIGI_OFF	Turn Digital Output to "OFF" state	**≥2.1.0**
DIGI_ON XX	Turn Digital Output to "ON" state for XX seconds	**≥2.1.0**
RAZ_COUNT	Counter reset	**≥2.0.0**
LOG_DL	Download datalogger values	**≥2.0.0 (non-EN12830)**
LOG_RST	Erase datalogger values and timestamp	**≥2.0.0 (non-EN12830)**
LOG_SP_DL XX YY	Download datalogger values from the index XX to index YY in chronological order (index 00 is the oldest value)	**≥4.0.0 (non-EN12830)**
LOG_SP_INV_DL XX YY	Download datalogger values from the index XX to index YY in reverse chronological order (index 00 is the newest value)	**≥4.0.0 (non-EN12830)**
GET_BATT_VOLTAGE	Return battery voltage in mV	**≥2.1.0**
GET_SENSOR_DATA	Return the last measured sensor value	**≥2.2.0**

6.2. *SIMPLE DATA LOGGER*

Ela innovation sensor tags can operate the "*Datalogger*" feature. The datalogger is a record of saved data, memorized while advertising, with each value associated with a time stamp, to be able to recover the moment when it was measured.

For firmware version strictly before V4.0.0, the datalogger can be retrieved in *Connected mode* using the "***LOG_DL***" command. The simple datalogger (non-EN12830) formatting for a temperature sensor with a log interval of 30 seconds is the following:

Temperature LOG:
DATA_START
0d0h0m30s:2712
0d0h1m0s:2730
0d0h1m30s:2695
…
1d3h25m30s :1505
END_OF_DATA

Temperature measured 30 seconds after the tag has booted (here 27.12°C)

Temperature measured 1 day, 3 hours, 25 minutes and 30 seconds after the tag has booted (here 15.05°C)

The simple datalogger formatting is the same for all ELA Innovation sensor products (xx**d**xx**h**xx**m**xx**s** followed by sensor data). The sensor data is the same as the one transmitted in advertising frames.
The "***LOG_RST***" command is used to delete datalogger data content.

For firmware version equal or above V4.0.0 (non EN 12830), it is possible to download only a subset of logged value in order to reduce the number of data downloaded and thus downloading time. The **"LOG_DL"** and **"LOG_RST"** still operate the same way as for previous firmware version.

The connected command "**LOG_SP_DL XX YY**" is used to download logged value between index XX and index YY in chronological order, index 00 being the oldest value logged.

The connected command "**LOG_SP_INV_DL XX YY**" is used to download logged value between index XX and index YY in reverse chronological order, index 00 being the newest value logged.

For a simple datalogger (non-EN12830) formatting for a temperature sensor with a log interval of 30 seconds, the results of the three downloading command are exemplified below:

LOG_DL	LOG_SP_DL 03 12	LOG_SP_INV_DL 03 12
Temperature LOG: **DATA_START** **0d0h0m30s:2712** **0d0h1m0s:2730** **0d0h1m30s:2695** **…** **1d3h24m30s:1617** **1d3h25m0s:1500** **1d3h25m30s :1505** **END_OF_DATA**	**Temperature LOG:** **DATA_START** **0d0h1m30s:2695** **0d0h2m0s:2700** **0d0h2m30s:2705** **…** **0d0h5m0s:2902** **0d0h5m30s:2875** **0d0h6m0s :2822** **END_OF_DATA**	**Temperature LOG:** **DATA_START** **1d3h25m30s:1505** **1d3h25m0s:1500** **1d3h24m30s:1617** **…** **1d3h20m30s:1200** **1d3h20m00s:1102** **1d3h19m30s :1015** **END_OF_DATA**

6.3. EN12830 DATA LOGGER (BLUE PUCK T EN12830 & BLUE PUCK TPROBE)

The EN12830 firmware has several new features:

- EN12830 Datalogger
- Calibration by 2nd-degree polynomial of temperature values
- Saving tag calibration values (Target values – measured values)

These EN12830 (2018) dedicated functionalities are protected by a BLE password. This password is inserted by the NFC configuration. The EN12830 tag configuration options are only available from *Device manager* version 1.3.0.

The PUCK T EN12830 dedicated documentation can here BLUE PUCK T ZN12830 Application Note

6.4. CONNECTED MODE RESTRICTIONS

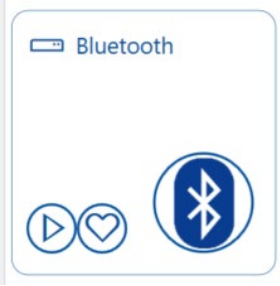
- During a NFC configuration, datalogger data is erased from the tag memory.
- If the tag is in *Connected Mode* and goes under an ***NFC-field***, then the tag will restart.

6.5. CONNECTING TO A ELA INNOVATION BLE TAG

. Enable internal Bluetooth or connect a Bluetooth device (typ. Dongle) to your PC

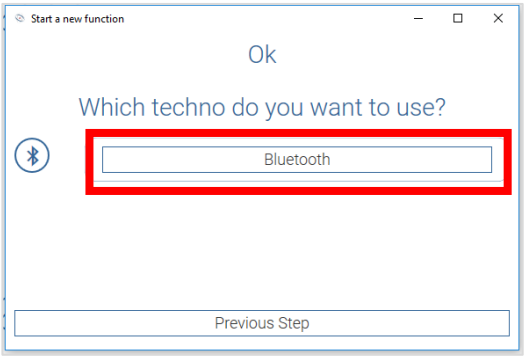
1. Launch the "**Device Manager**" desktop application 

2. Start the **"Bluetooth" widget** by clicking  button



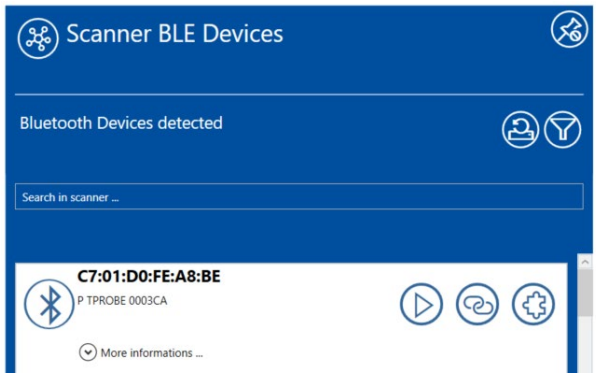
3. Start the **BLE device search** 

4. Click on the found device. The ***Bluetooth*** windows appears



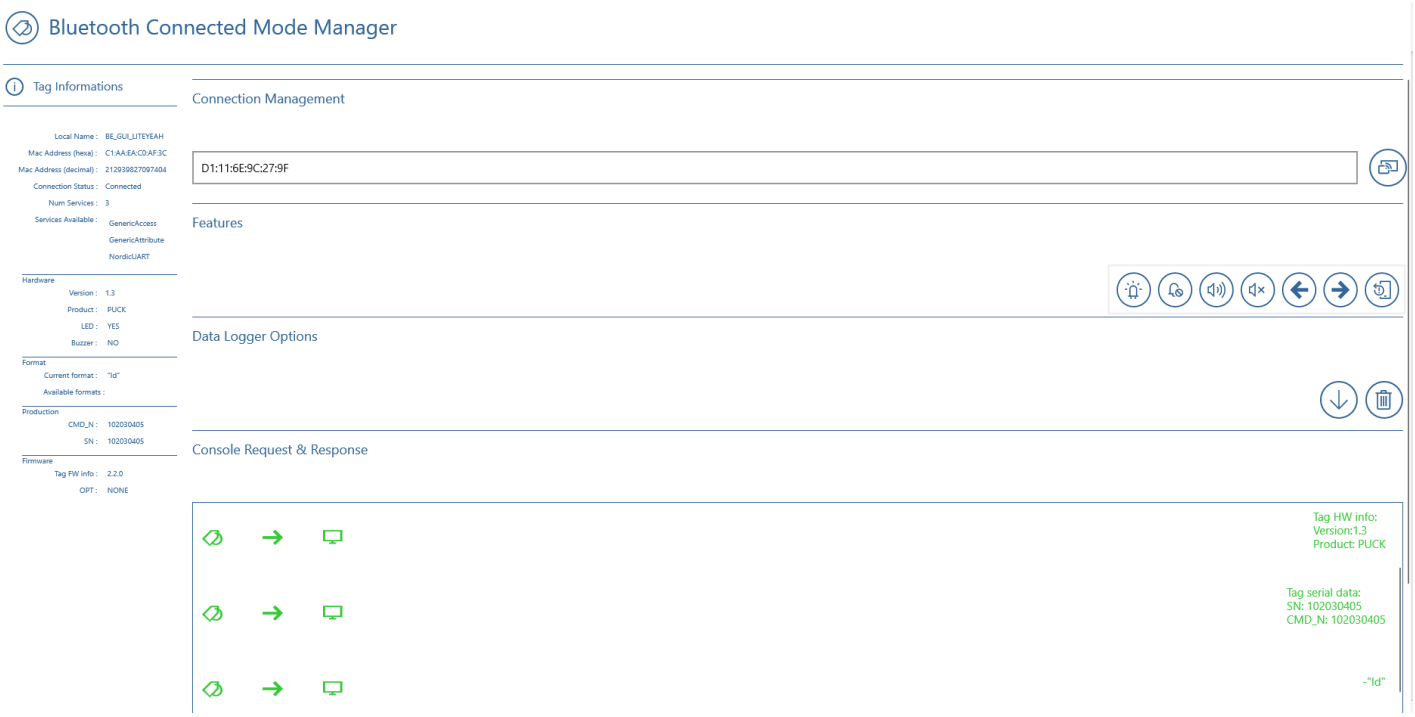
Once reader has been chosen, this window appears

5. Start the ***BLE Device scanner*** 



On this window, it is possible to search for a Name or MAC Address from the entire drop-down list (see next page)

6. Start the connection by pressing  icon . The *Device Manager Connector* window opens:



- **Features:** Commands to send to the tag (see next page for commands syntax and use)
- **Informations :** Name –Mac Adress – Connection status – Available services
- **Hardware – Format - ...:** Services details and tag options

« Commands » description

ICONS	COMMANDS	ACTIONS
	LED_ON	Turn ON the LED (infinite Blink)
	LED_OFF	Turn OFF the LED
	BUZZ_ON	Turn ON the buzzer (repeated beep)
	BUZZ_OFF	Turn OFF the buzzer
	DIGI_ON	Turn Digital Output to “ON” state
	DIGI_OFF	Turn Digital Output to “OFF” state
	RAZ_COUNT	Counter reset (for MAG, MOV and DI formats)
	LOG_DL	Download datalogger values
	LOG_RST	Erase datalogger values and timestamp

- **LED & BUZZER commands:**

  For lifetime constraints, LED and BUZZER commands cannot be turned ON at the same time.

- **Datalogger download :**

  The « **LOG_DL** » command is used to download the recorded log data.
  Detailed Data according to sensor can be found on the application note on the ELA website.

7. PRODUCT OPERATION

OVER THE AIR PROGRAMMING (OTAP) SOFTWARE UPDATE

OTAP (Over-The-Air Programming) is a method used to update a software, data or settings of a product without having to disassemble it and do it in a completely wireless way.

Ela Innovation products programmed with firmware version >3.0.0 can use OTAP Mechanism to update the tag embedded firmware, which can be done without having to return the product to ELA Innovation.

The OTAP procedure is secured by 2 methods:

- The switch into OTAP mode of ELA Innovation products is protected by a password that can be set by the user with NFC configuration
- The firmware update package is signed by a SHA256 private key.

The OTAP procedure and material requirements are described on the OTAP Application Note, available on the ELA Innovation

8. NORMS & STANDARDS

FCC Statement

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.

Industry Canada Statement

This device complies with ISED's licence-exempt RSSs. 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.

CE Mark

- FCC Mark

- RoHS Certified

- Bluetooth 4.2