SPOT – sensor raw data format

You can access the raw data of the parking sensor as a hexadecimal string, which the CRa network delivers within a JSON. The following text describes the format and meaning of the hexadecimal string.

In the CRa JSON, we concentrate on two following fields:

1. **"EUI"** – the sensor ID. The sensors installed for CRa have the format 474F5350EB00001**X** where X ranges from 1 to 6, corresponding with the number of the parking slot (i.e. value 474F5350EB000011 represents slot **1**, …, value 474F5350EB000016 represents the slot **6**).

2. **"data"** – a 24-character long string, representing the hexadecimal-encoded binary data (little endian byte order) of the SPOT sensor. The transmitted data are of the following format:

Field name	Type	Description
event	`uint8`	Bitwise meaning - see Event codes
errors	`uint8`	Bitwise meaning - see Error codes
mag_total	`uint8`	Range: 0 – 255
temperature	`int8`	Range: -127 °C to 127°C
bat-level	`uint16`	Range: 0 to 65535, in mili-Volts (e.g. 3350 mV)
mag raw x	`int16`	-32,768 to 32,767
mag raw y	`int16`	-32,768 to 32,767
mag raw z	`int16`	-32,768 to 32,767

Event codes:

Binary	Hexa	Meaning
0000 0001	0x01	Parking slot is free
0000 0010	0x02	Parking slot is busy
0000 0100	0x04	Idle message
0000 1000	0x08	Reset performed
0001 0000	0x10	Calibration started
0010 0000	0x20	Calibration ended
0100 0000	0x40	Error occurred (see errors)
1000 0000	0x80	Significant change in magnetic field measured

Error codes:

Binary	Hexa	Meaning
0000 0001	0x01	Magnetometer not responding
0000 0010	0x02	Low battery voltage
0000 0100	0x04	Too high temperature
0000 1000	0x08	Calibration failed

Example

The JSON delivered by CRa network:

```
{
  "EUI":474F5350EB000015 // slot No.5

  "data": 05000d1c480e40ff1000dbfe //binary data as hexa
}
```

The data string decoded:

Field:	event	error_code	mag_total	Temp	bat_level	mag_x	mag_y	mag_z
Hexa:	05	00	0d	1c	480e	40ff	1000	dbfe
Decimal:	5	0	13	28	3656	-192	16	-293

Please note that the data is in <u>little endian</u>, therefore e.g. "480e" represents the value 3565, as explained by the following table:

LITTLE ENDIAN				
hex	bin	dec	Base	dec * Base
48	01001000	72	1	72
0E	00001110	14	256	3584
				3656

Interpretation of the data:

The parking sensor no. 5 transmitted following telemetry:

- event is 5 (decimal) = 0101 (binary) = 0x04 & 0x01 (hexa) – this is an <u>Idle</u> message (no car moved), and the slot is <u>free</u>.
  Please note, that if the event is 0x01 & 0x02, i.e. the slot is indicated both as busy and free, the sensor is confused and cannot decide the status of the parking slot due to a very small magnetic response of the car.
- error_code is 0 – no error reported.
- The size of the magnetic field change, "mag_total", is 13.
- The current temperature is 28°C.
- Battery level is 3656 mV.
- The magnetic vector has the coordinates: [x, y, z] = [-192, 16, -293].