Payload description

Environmental sensor CO2/T/RH/P NBIoT

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CO2/T/RH/P device is dedicated for air quality measurement. Payload consists from CO2 concentration in the moment of periodical transmission in ppm, minimum and maximum C02 concentration in given scan time, temperature, air relative humidity and air pressure (if equipped). Because CO2 detector – SCD30 has significant influence to power consumption and then to battery lifetime, we recommend carefully set the scan time between 2 transmission. If scan time is set too short, then battery will be exhausted fast. If the device is powered externally, then the scan time can be set e.g. to 1 minute to collect minimum and maximum concentration of CO2 between 2 transmissions more precisely.
Payload within NBIoT infrastructure consists of 4 byte long unique ID (device ID) and rest of the device specific data. The device ID range is from 0x0000001 to 0xFFFFFFF which is defined by Solidus Tech s.r.o. in production process.
All characters within payload structure are HEX string unless otherwise stated. Whole string contains always pair of characters between 00 and FF if domain is not limited. Explanation is available in three numeric system:

1. HEX … characters are declared in following form: 0x00 to 0xFF
2. DEC … characters are described as usually 0 to 255
3. BIN … characters are described in following form: 0B00000000 to 0B11111111

Payload structure

The payload for given end point is **15 bytes (30 hex characters)** long and its structure is as follows:

Byte	Meaning	Range	Note
1	Battery voltage	0x00 to 0xFF	Byte x 30 = voltage [mV]
2	Signal quality	0x00 to 0x63	0..63 – signal quality , 99 – signal quality not retreived
3	MSB temperature	0x00 to 0xFF	value/10 = temperature [°C]
4	LSB temperature	0x00 to 0xFF	
5	MSB RH	0x00 to 0xFF	value/10 = RH[%]
6	LSB RH	0x00 to 0xFF	
7	MSB air pressure	0x00 to 0xFF	value/10 = air pressure [hPa] Not equipped by default
8	LSB air pressure	0x00 to 0xFF	
9	MSB CO2	0x00 to 0xFF	value = CO2 [ppm]
10	LSB CO2	0x00 to 0xFF	
11	MSB CO2 minimum	0x00 to 0xFF	value = CO2 minimum [ppm]
12	LSB CO2 minimum	0x00 to 0xFF	
13	MSB CO2 maximum	0x00 to 0xFF	value = CO2 maximum [ppm]
14	LSB CO2 maximum	0x00 to 0xFF	
15	Info byte	0x00 to 0xFF	See below

Info byte meaning – 15. Byte

MSB	6	5	4	3	2	1	LSB
HW version	HW version	HW version	FW version	FW version	FW version	Reserve	Reserve
0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1

Payload example for miniUNI CO2/T/RH/P FW 1.0:

Payload: 731800FC01182412022601A5073324

Byte	Meaning	Note
0x73	VDD = 0x73	Battery voltage VDD = 115 * 30 = 3450mV
0x18	RSSI = 0x18	RSSI = 24-110 = -86dB
0x00	0x00FC	0x00FC = 252 =>252/10 = 25,2°C
0xFC		
0x01	0x0118	0x0118 = 280 =>280/10 = 28,0%
0x18		
0x24	0x2412 = 9234	Air pressure = 9234/10 => 923.4hPa
0x12		
0x02	0x0226 = 550	CO2 = 550 ppm
0x26		
0x01	0x01A5 = 421	CO2 minimum = 421 ppm
0xA5		
0x07	0x0733 =1843	CO2 maximum = 1843 ppm
0x33		
0x24	0x24	HW rev. 1, FW rev. 1

CO2 calibration procedure:

1. Ensure sufficient power for the device either from battery or external flasher unit
2. Insert USB/UART converter
3. Type **sensor:on** command and leave stabilize the measurement results for at least 2 minutes. The greed LED will start flashing in 100ms interval
4. Type command **scd** – you will get latest values of CO2, temperature and humidity. Compare with reference value
5. Type command **clbr:xxxx**, where xxxx is reference value of CO2 – this value will be written to the calibration register and you can evaluate it by typing **getclbr** command
6. Check value again with **scd** command and if necessary, repeat step 5.
7. When calibration procedure is successfully over, type **sensor:off** or **reset** command, the device is then ready for periodic operation.

Revision

1.0	Initial FW
1.1	Calibration procedure added