

Payload WSLRW-LPC | Firmware 1.0

1. Payload document is applied for the following products

| Item code | HW Version | Firmware Version | Remarks |
|--------------|------------|------------------|---------|
| WSLRW-LPC-11 | 1.0 | 1.0 | |
| | | | |

2. Changes information in this version v.s previous version

| Item | Changes | Changed by | Changed Date | Approved by | Approved Date |
|------|-----------------|------------|--------------|-------------|---------------|
| 1 | Initial version | P.N.Diep | 09-05-2022 | N.V.Loc | 28-05-2022 |

i The approved date is also the release date of this document.

3. Payload for Uplink messages

| When? | Purpose | Wait for Downlink? | LED color |
|--|---|--------------------|----------------|
| This message will be sent in the pre-defined cycle OR when the resettable counter passes the threshold | To get the measured value from the device in the pre-defined cycle or when the counter passes the threshold | NO | Not applicable |

Uplink Payload structure:

| Payload | Sensor type | Battery level | Hw_error | reserved | NRC_People | NRC_People | RC_People | RC_People | Dist_front | Dist_back |
|---------|-------------|---------------|----------|----------|------------|------------|-----------|-----------|------------|-----------|
| bits | 8 | 2 | 2 | 4 | 16 | 16 | 8 | 8 | 16 | 16 |
| Value | yes | yes | yes | zeros | yes | yes | yes | yes | yes | yes |

4. Payload Fields of Uplink

The length of the uplink payload is 12 bytes. Please refer below for an explanation.

| Data | Size (byte) | Bit | Format | Meaning |
|-----------------------------|-------------|-------------|--------|---|
| Sensor type | 1 | all | UInt8 | Sensor type = 0x13 means LoRaWAN People Counter |
| Status: battery level | 1 | Bit 7 and 6 | UInt8 | Battery capacity in 04 levels |
| | | | | 11: battery level 4 (99%) |
| | | | | 10: battery level 3 (60%) |
| | | | | 01: battery level 2 (30%) |
| | | | | 00: battery level 1 (10%) |
| Status: sensor module error | | Bit 5 and 4 | | Status |

| | | | | |
|-----------------|---|-----|--------|-------------------------------------|
| | | | | 01: sensor module error |
| | | | | 00: no error with sensor module |
| NRC_People_in | 2 | all | Uint16 | Non-resettable counter |
| NRC_People_out | 2 | all | Uint16 | Non-resettable counter |
| RC_People_in | 1 | all | Uint8 | Reset to 0 after sending to Gateway |
| RC_People_out | 1 | all | Uint8 | Reset to 0 after sending to Gateway |
| Dist_front_zone | 2 | all | Uint16 | Distance of front zone |
| Dist_back_zone | 2 | all | Uint16 | Distance of back zone |

5. Payload for Downlink messages

Users can use a downlink message to change the configuration of the device. There are 02 types of downlink messages:


- **Downlink type = 0:** to write the configuration for the specific type of Sigfox-ready sensor. The format is fixed for each type of sensor. **However**, this FW version does not support type 0 configuration. It only supports type 5 as below.
- **Downlink type = 5:** to write a value to any address of configuration parameter of any Sigfox-ready sensor. This method is generic and can be applied to any type of Sigfox-ready sensor, the user just needs to know the memory map of the sensor.

5.1 Downlink type = 0

Not available in this FW version.

5.2 Downlink type = 5

With this downlink, the user can write the configuration to any address on the memory map of the device. Please refer to the memory map of the device to understand what parameters can be written.

 The length of the configuration parameter can be 1, 2 bytes, or 4 bytes, but the total length of the Downlink payload must equal 64 bits (8 bytes). Please see below the downlink format for both types.

Downlink type 5 for the parameter of 2 bytes length:

| Payload | PRM_ADDRESS | PRM_LENGTH | PRM_VALUE | reserved | DOWNLINK_TYPE |
|---------|-------------|------------|-----------|----------|---------------|
| bits | 8 | 8 | 16 | 28 | 4 |
| Value | yes | 0x02 = 2 | yes | zeros | 0b0101 = 5 |

Downlink type 5 for the parameter of 4 bytes length:

| Payload | PRM_ADDRESS | PRM_LENGTH | PRM_VALUE | reserved | DOWNLINK_TYPE |
|---------|-------------|------------|-----------|----------|---------------|
| bits | 8 | 8 | 32 | 12 | 4 |
| Value | yes | 0x04 = 4 | yes | zeros | 0b0101 = 5 |

Where:

- PRM_ADDRESS: address of the configuration parameter in the memory map of the device;
- PRM_LENGTH: is the length of that parameter, in bytes;
- PRM_VALUE: is the value the user wants to write to that parameter;
- reserved: a series of bits of zero to fulfill the downlink so that it has the total length = 64 bits (8 bytes)

EXAMPLE FOR DOWNLINK TYPE = 5

- ✓ Here is the list of parameters of WSLRW-LPC that can be configured via Downlink type = 5, and the examples of the payload of downlink on the right-most side column. It is the example value, not the default value of the device. Please check the memory map of the device for more detail about the parameters.

⚠ **Note: the total length of down link must be equal 8 bytes**

| Parameter (bytes) | PRM_ADDRESS 1 | PRM_LENGTH 1 | PRM_VALUE 4 | DOWNLINK_TYPE 2 | Downlink Payload 8 |
|----------------------|------------------|-----------------|-------------------|--------------------|-----------------------|
| cycle_send_data | 0x4E | 0x04 = 4 | 0x00000E10 = 3600 | 0x0005 | 4E0400000E100005 |
| sensor_sampling_rate | 0x54 | 0x04 = 4 | 0x00000078 = 120 | 0x0005 | 5404000000780005 |
| count_threshold | 0x80 | 0x02 = 2 | 0x0014 = 20 | 0x0005 | 8002000000140005 |
| dist_threshold | 0x81 | 0x02 = 2 | 0x0640 = 1600 | 0x0005 | 8102000006400005 |
| dist_hys | 0x82 | 0x02 = 2 | 0x0064 = 100 | 0x0005 | 8202000000640005 |
| inter_meas_period | 0x83 | 0x02 = 2 | 0x0030 = 48 | 0x0005 | 8302000000300005 |

5.3 Free online data conversion tools

- To convert from Float to Hex and vice versa, users may use this free online tool:
<https://gregstoll.com/~gregstoll/floattohex/>
- To convert a decimal number to Hex, the user may use this free online tool:
<https://www.binaryhexconverter.com/decimal-to-hex-converter>

6. Reed switches

The Sigfox-ready sensor normally comes with at least 1 reed switch for user manipulation during commissioning or maintenance.

Some other versions come with 02 reed switches.

The WSSFC-AC comes with 1 reed switch, please find below the functions of this switch.

| EVENT | PRE-CONDITION | ACTION | LED STATUS | ACTIVITIES | POST-CONDITION |
|------------------|---------------|--|----------------|---|----------------------------|
| FORCE_DATA | Any state | Move Magnet Key to the contact point of REED SWITCH. Led blink SKY BLUE, move Magnet Key away. | Blink SKY BLUE | the device will send the uplink message FORCE_DATA | Back to the previous state |
| PARAMETERS_UPDAT | Any state | Move Magnet Key to the contact point of REED SWITCH. Led blink SKY BLUE, hold Magnet Key 5s. Led blink PURPLE, move Magnet Key away. | Blink PURPLE | the device will send the uplink message PARAMETER_UPDATE and wait for a new downlink to get the new configuration | Back to the previous state |

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