# Parking Pill Payload Description

Parking Pill sends five types of messages:

- NETWORK - Contains commands and information with relation to the Sigfox network
- SYSTEM - System message is used to inform user about different states of the sensor
- BTT - Battery message send an information about battery in 16 different levels
- TMP - Temperature message send temperature of sensor in 16 different levels
- CC - Car count message sends count of parked cars during last 24 hours
- ERR - Error message (sent in case of sensor malfunction)

For better and stable Sigfox transmission, the sensor is sending only 1 byte of payload for each message type. The last 3 bits (7,6,5) are determining the message type.

## Uplinks

### NETWORK

Contains commands and information with relation to the Sigfox network.

| STR -to server | | | | | | | |
|---|---|---|---|---|---|---|---|
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 0 | 1 | 1 | 0 | 0 | MSG limit reached | OOB | MAC_SERVICE |

OOB - This msg opens receive window and will be able to receive data. If command is accepted CMD_OK is sent. If downloaded msg is empty or is incorrect no msg will be sent.

MSG limit reached - The maximum amount of IoT messages have been sent, no more messages will be sent until the reset of limit. Once every 24 hours. For Sigfox applies 140/ day.



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MAC_SERVICE - Msg sent when there is a pending MAC commands that needs to be sent to the network.

**SYSTEM**

Contains information about basic operation and status of the sensor.

| STR -to server | | | | | | | |
|---|---|---|---|---|---|---|---|
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | CMD_OK | INTG_CMP | START_UP |

START_UP - If this flag is set to 1, the sensor is activated, this means it will begin to monitor the magnetic field in the surrounding area. During this time DO NOT park a car on the sensor or it may disrupt the operation.

INTG_CMP - If this flag is set to 1, the sensor has completed its analysis of the magnetic field and can now be used as a parking space occupancy sensor.

CMD_OK - Command that has been sent over OOB has been received and accepted.

**BTT**

First bit of battery message are reserved for parking occupancy information. Bit 1 to 4 handle an information about battery state in 16 levels represents capacity in percentage (BTT * 6,7 = X%). This msg is sent every 2 days. Due to the chemistry of the battery used, this information is very distorted. For the end user this information should not be directly shown. Rather if the percentage of the battery drops to below 15% the user should be warned that the sensor will have to be replaced in the next couple of weeks.

| BTT | | | | | | | |
|---|---|---|---|---|---|---|---|
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 0 | 0 | 1 | BTT 3 | BTT 2 | BTT 1 | BTT 0 | PARK |

**TMP**

First bit of temperature message are reserved for parking occupancy information. Bit 1 to 4 handle an information about temperature (TMP * 5 - 20= X°C) and if TMP is 16 temperature is over 80°C. Park 0 means the parking spot is empty, park 1 means parking spot is occupied. This msg is sent once every hour. If a change in parking status occurred before a hour has passed the msg will be sent sooner.

| TMP | | | | | | | |
|---|---|---|---|---|---|---|---|
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 0 | 1 | 0 | TMP 3 | TMP 2 | TMP 1 | TMP 0 | PARK |

**CC**

In car count message bit 0 to 4 represents count of cars parked on sensor in last 24 hours. Should this counter overflow before the 24 hour period elapsed, the message will be sent sooner. For this counter to increment by 1 a car has to park and leave. If a car is parked on the sensor for the full 24 hour period this counter will be 0.

| CC | | | | | | | |
|---|---|---|---|---|---|---|---|
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 1 | 0 | 0 | CC 4 | CC 3 | CC 2 | CC 1 | CC 0 |

**ERR**

Error message handle an information from self diagnostic test of each periphery. This msg is also sent should an unexpected restart of the sensor occurred.

| ERR | | | | | | | |
|---|---|---|---|---|---|---|---|
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 1 | 1 | 1 | RES 1 | WDOG | PHOTO | BATT | MAG |

MAG - Magnetic sensor is not responding. If this msg is sent multiple times in a row. The sensor has malfunctioned and needs to be replaced. This is not a problem if only one msg with this error has been sent.

BATT - The battery is critically low. The sensor needs to be replaced.

PHOTO - The protective polyurethane foam cover has been damaged and the sensor is detecting light. The protective cover needs to be fixed to prevent damage to the sensor.

WDOG - An unknown error has occurred. If this error occurred multiple times in a row the sensor will have to be replaced.

**BASELINE**

2-4 bytes. Signed 16 bit integer.

# Downlinks

**All downlinks need to be padded to be at least 10 bytes long. And need to be sent on port 1 to work!!!**

**Restart request:**

This request will cause the sensor to schedule a restart. You must specify a countdown in hours until the restart. This countdown begins when device confirms the command by sending 0x04.

Length: 10 bytes.

Bytes:

| Name | Restart request | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| N. byte | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Desc | 0x01 | TIME_H | TIME_L | RES | RES | RES | RES | RES |

0x01 - ID of the request
Time - In hours the time to the restart. Minimum is 1. First byte is MSB.
Res - Padding.