5.2 Payload Format

The implemented software is based around the GPS and the MPL3115A2 and the packets payload is composed of 15 bytes. Of course, this payload is only given as an example and the user is free to change it or to add further information coming from other sensors: The current payload is composed of:

Byte [0] > Value: 0x00 or 0x01

The first byte of the payload indicates the status of LED3 which is controllable from the LoRaServer. The server can remotely switch this LED ON or OFF.

Byte [1] > Value: MSB of the MPL3115A2 measured atmospheric pressure
Byte [2] > Value: LSB of the MPL3115A2 measured atmospheric pressure

Byte 1 and 2 represent the atmospheric pressure in dPa (deci-Pascal) as it is measured through the MPL3115A2. This value can easily be divided by 10 to get the standard hPa value.

Byte [3] > Value: MSB of the MPL3115A2 measured Temperature
Byte [4] > Value: LSB of the MPL3115A2 measured Temperature

Byte 3 and 4 represent the signed value of the temperature (x 100) as it is measured through the MPL3115A2. This value can easily be divided by 100 to get the temperature with decimal values

Byte [5] > Value: MSB of the MPL3115A2 measured Altitude
Byte [6] > Value: LSB of the MPL3115A2 measured Altitude

Byte 5 and 6 represent the signed value of the altitude (x 10) as it is measured through the MPL3115A2. This value can easily be divided by 10 to get the altitude with decimal values. It is important to notice that the value returned is not calibrated. The MPL3115A2 returns the estimate altitude relative to the atmospheric pressure. Depending on the measurement condition, the value may be within plus or minus 100m. Please, refer to the component datasheet for more details.

Byte [7] > Value: 0x00 to 0xFF

The seventh byte of the payload indicates the status of the battery. The status of the battery is returned as described in the LoRaMAC specification:

0x00:	The device is connected to an external power source
0x01 to 0xFE:	The battery level, 1 being the minimum and 254 the maximum. This measurement is a linearized discharge function of the battery and is thus battery dependent
0xFF:	The LoRaMote was not able to read the battery level

Byte [8]	>	Value:	MSB of the UP501 received Latitude
Byte [9]	>	Value:	CSB of the UP501 received Latitude
Byte [10]	>	Value:	LSB of the UP501 received Latitude

Byte 8, 9 and 10 represent the latitude as defined by the LoRaMAC specification. The north-south latitude is encoded using a signed 24 bit word where -2^{23} corresponds to 90° south (the South Pole) and $2^{23}-1$ corresponds to 90° north (the North Pole). The equator corresponds to 0.

Byte [11]	>	Value:	MSB of the UP501 received Longitude
Byte [12]	>	Value:	CSB of the UP501 received Longitude
Byte [13]	>	Value:	LSB of the UP501 received Longitude

Byte 8, 9 and 10 represent the longitude as defined by the LoRaMAC specification. The east-west longitude is encoded using a signed 24 bit word where -2^{23} corresponds to 180° west and $2^{23}-1$ corresponds to 180° east. The Greenwich meridian corresponds to 0.

Byte [14]	>	Value:	MSB of the UP501 received Altitude
Byte [15]	>	Value:	LSB of the UP501 received Altitude

Byte 14 and 15 represent the value of the altitude (in meters) as it is received through the UP501.

5.3 PER Analysis

It is also important to notice that some of the LoRaMAC protocol frames can be used to perform network testing such a PER test. A PER test can be perform thanks to the sequence number which is maintained between the LoRa Server and the LoRaMote. Every packet send from the LoRaMote is numbered and thus can be extracted from the LoRaMAC on the server side to perform the PER analysis. For more information on the sequence numbering or on any other aspect of the protocol, please refer to the LoRaMAC specifications