AM100/AM102 Payload Structure

V1.2

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1. Uplink Payload Structure

An uplink message can be sent from AM100/AM102 to gateway. Also, the AM100/AM102 sends different sensor data in different frames. In order to do that, all sensor data must be prefixed with two bytes:

Data Channel: Uniquely identifies each sensor in the AM100/AM102 across frames, e.g. "Temperature Sensor".

Data Type: Identifies the data type in the frame, e.g. "Battery Level".

The device can send multiple sensor data at a time by using the following payload structure:

1 Byte	1 Byte	N Bytes	1 Byte	1 Byte	M Bytes	1 Byte	...
Channel1	Type1	Data1	Channel2	Type2	Data2	Channel 3	...

Channel ID	Description
1	Battery
2	Reserved
3	Temperature Sensor
4	Humidity Sensor
5	PIR Sensor
6	Light Sensor
7	CO_2 Sensor
8	TVOC Sensor
9	Barometric Pressure Sensor

For message decoder please refer to https://github.com/Ursalink-CN/ursalink-decoder to find code examples.

Uplink Packet Example

Frame N: Regular uplink (temperature, humidity, activity level (PIR), illumination, CO2, TVOC, barometric pressure)

03 67 fc 00		
Channel	Type	Value
03 (Temperature Sensor)	67 (Temperature)	fc 00 => 00 fc = 252 Tem=252*0.1=25.2°C

04 68 49		
Channel	Type	Value
04 (Humidity Sensor)	68 (Humidity)	49=>73 Hum=73*0.5= 36.5%

05 6a 36 00		
Channel	Type	Value
05 (PIR Sensor)	6a (Activity Level)	36 00 => 00 36 = 54

06 65 1c 00 79 00 14 00		
Channel	Type	Value
06 (Light Sensor)	65 (Illumination)	Illumination:1c 00 => 00 1c = 28 lux Visible+Infrared: 79 00 => 00 79 = 121 Infrared: 14 00=> 00 14 => 20

07 7d 19 02		
Channel	Type	Value
07 (CO_2 Sensor)	7d (Concentration)	19 02 => 02 19 = 537 ppm

08 7d 00 00		
Channel	Type	Value
08 (TVOC Sensor)	7d (Concentration)	00 00 => 00 00 = 0 ppb

09 73 3f 27		
Channel	Type	Value
09 (Barometric Pressure Sensor)	73 (Barometric Pressure)	3f 27 => 27 3f = 10038 Pressure=10038*0.1 =1003.8hPa

Frame N+1: Battery level changes uplink.(Battery level reports once per day)

01 75 5a		
Channel	Type	Value
01 (Battery)	75 (Battery Level)	5a = 90 means 90%

Frame N+2:

Contents reported after reboot each time: Ursalink Custom Format Version + SN + Hardware Version + Software Version + Class Type + Sensor Collection Type

ff 0b ff ff 01 01					
Channel	Type	Value	Channel	Type	Value
ff	0b (Device Restart Notification)	ff (Reserved)	ff	01	01 (Version 1)

ff 08 61 28 a1 03 57 95		
Channel	Type	Value
ff	08 (Device SN)	61 28 a1 03 57 95

ff 09 01 40 ff 0a 01 01					
Channel	Type	value	Channel	Type	Value
ff	09 (Hardware Version)	0140 (V1.4)	ffd	0a (Software Version)	0101 (V1.1)

ff 0f 00		
Channel	Type	value
ff	0f (Class Type)	00 (Class A)

ff 18 00 7F		
Channel	Type	value
ff	18(Sensor Collection Type)	00 7F(00=all 7 sensors, 7F=0111 1111 means all 7 sensors are collection enabled)

2. Downlink Payload Structure

A downlink message can be sent from gateway to sensor in order to perform some actions on that device.

Note: the application port of AM100/AM102 is 85.

1 Byte	2 Bytes	1 Byte1	1 Byte	2 Bytes	1 Byte
Channel1	Data1	0xff (Reserved)	Channel2	Data2	0xff (Reserved)

Downlink Packet Example

Frame N: Set the data reporting interval as 20 mins (1200s).

ff 03 b0 04		
Channel	Type	Value
ff	03 (Set Reporting Interval)	b0 04 => 04 b0 = 1200 (second)

Frame N+1: Disable temperature collection.

ff 18 01 01		
Channel	Type	Value
ff	18 (Sensor Collection Type)	01 01

2. Data Types

3.1 IPSO Standard Definition

Data Types conform to the IPSO Alliance Smart Objects Guidelines, which identifies each data type with an "Object ID" . However, as shown below, a conversion is made to fit the Object ID into a single byte.

DATA_TYPE = IPSO_OBJECT_ID - 3200

Type	IPSO	Hex	Data Size	Data Resolution per Bit
Temperature Sensor	3303	67	2	0.1°C Signed MSB
Humidity Sensor	3304	68	1	0.5% Unsigned
PIR Sensor	3306	6a	2	1
Illumination Sensor	3301	65	2	1 Lux Unsigned MSB

Concentration	3325	7d	2	1
Barometer	3315	73	2	0.1 hPa
Battery	3317	75	1	1%

3.2 Ursalink Custom Format

Type	Type ID	Data Size/Byte	Data Description
Ursalink Custom Format Version	01	1	0x01
Data Collection Interval	02	2	1s
Data Reporting Interval	03	2	1s
LoRa Channel Mask	05	3	ID (1B) + Value (2B) ID: 1~6
Debug Level	07	1	Bit0:info Bit1:debug bit2:warn Bit3:err
Device SN	08	6	641090824375 => 0x641090824375
Hardware Version	09	2	0110 => 0x01 0x10
Software Version	0a	2	0110 => 0x01 0x10
Device Restart Notification	0b	1	0xff reserved
Device Power Off Notification	0c	1	0xff reserved
Class Type	0f	1	00: Class A
Sensor Collection Type	18	2	Chan(1B)+Value(1B) Chan=01 to 07, Value=01 means enabled, Value=00 means disabled Temperature: Chan=01 Humidity: Chan=02 PIR: Chan=03 Light: Chan=04 CO_2: Chan=05 TVOC: Chan=06 Barometric Pressure: Chan=07 If Chan=00, per bit of Value control the collection of every sensor

3.3 LoRaWAN Parameter

DevEUI	24E124 + 2nd to 11th digits of SN e.g. SN = 61 26 a1 01 84 96 Then Device EUI = 24E124126a101849
AppEUI	24e124+c0002a0001
Appport	0x55
NetID	0x010203
DevAddr	The 5th to 12th digits of SN e.g. SN = 61 26 a1 01 84 96 Then DevAddr = a1018496
AppKey	5572404c696e6b4c6f52613230313823
NwkSKey	5572404c696e6b4c6f52613230313823
AppSKey	5572404c696e6b4c6f52613230313823

---End---