REMOTICOM
OAB.

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Preface.

In the world of Internet of Things, it is important to be able to send messages in a suitable manner. Therefore, there are a few points to consider.

- Number of messages to be sent and the size of each message.
  - Flexibility
  - Overhead
- Easiness of use / understanding
- Compatibility

Based on the above points Remoticom developed the OAB protocol, which is based on the IPSO[1], Internet Protocol Smart Objects, standard. As the name suggests, IPSO uses smart objects to manage the device's data. These smart objects represent sensor data or device states, for example. They are flexible, stackable and have only a small overhead.

[1] https://en.wikipedia.org/wiki/IPSO_Alliance#:~:text=The%20IPSO%20in%20IPSO%20Alliance,consumer%2C%20healthcare%20and%20industrial%20applications.

IPSO.

IPSO makes use of smart objects, in simpler terms this means that every value has a header. The IPSO headers consists of an object, an instance and a resource. The value has a variable size, which depends on the resource.

Object

The object describes the type of sensor / device and occupies 2 bytes. Examples of an object are a humidity sensor, a temperature sensor (sensors), a buzzer or a dimmer (actuators).

Instance

The instance is the identifier of an object. When a device has multiple sensors / actuators of the same type, distinction can be made by the instance. The instance only uses one byte.

Resource

A resource defines an objects property. Every object can have multiple resources. A temperature sensor can have a minimum and maximum value, for example.

Example


```
[{
    "Object_ID":        3333,
    "Instance_ID":      0,
    "Resource_ID":      5518,
    "Value":            1612874689,
},
{
    "Object_ID":        3316,
    "Instance_ID":      0,
    "Resource_ID":      5700,
    "Value":            3.3,

}]
```


Object_ID:	3333	OBJECT TIME
Instance_ID:	0	
Resource_ID:	5518	RESOURCE TIMESTAMP
Value:	1612874689	TIME_T
Object_ID:	3316	OBJECT VOLTAGE
Instance_ID:	0	
Resource_ID:	5700	RESOURCE SENSOR VALUE
Value:	3.3	FLOAT

OAB.

The base of IPSO is very flexible but has some overhead and is missing some items for Remoticom's daily usage.

Keeping the flexibility (1 byte)

The very first byte in the OAB protocol defines the protocol.
In case of new requirements in the future, the OAB protocol can adapt through this byte.
This makes it also possible to keep devices with the old protocol up and running.

Identifying sender (12 bytes)

Identifying the sender must be done by using an unique identifier.
In the past we experimented with identifying devices based on a fixed IP address.
Unfortunately, at some point devices received a new IP address. Therefore, Remoticom has chosen for certainty and makes use of the unique identifier of the microcontroller.

RSSI (1 byte)

The signal strength of a device is an interesting sensor value. Remoticom has chosen that every message must contains this value. Therefore, this sensor value is included in the OAB header and does not have an IPSO header to minimalize overhead.

Length (2 bytes)

The length is used to check if all bytes are transferred and to determine how large the IPSO data is. The length does not include the OAB header nor the length bytes itself.


```
{
    "Identifier":   43
    "Unique_id":    "00112233445566778899001122",
    "Rssi":         18,
    "Length":       18
    [{
        "Object_ID":        3333,
        "Instance_ID":      0,
        "Resource_ID":      5518,
        "Value":            1612874689,
    },
    {
        "Object_ID":        3316,
        "Instance_ID":      0,
        "Resource_ID":      5700,
        "Value":            3.3,

    }]
}
** These values are fictional and only used as an example
```

Version management

V 1.0 – First draft.	Sam Michielsen	09-02-2021

Appendix 1. Default IPSO Objects

ID	Name
3200	DIGITAL_INPUT
3201	DIGITAL_OUTPUT
3202	ANALOGUE_INPUT
3203	ANALOGUE_OUTPUT
3300	GENERIC_SENSOR
3301	ILLUMINANCE_SENSOR
3302	PRESENCE_SENSOR
3303	TEMPERATURE_SENSOR
3304	HUMIDITY_SENSOR
3305	POWER_MEASUREMENT
3306	ACTUATION
3308	SET_POINT
3310	LOAD_CONTROL
3311	LIGHT_CONTROL
3312	POWER_CONTROL
3313	ACCELEROMETER
3314	MAGNETOMETER
3315	BAROMETER
3316	VOLTAGE
3317	CURRENT
3318	FREQUENCY
3319	DEPTH
3320	PERCENTAGE
3321	ALTITUDE
3322	LOAD
3323	PRESSURE
3324	LOUDNESS
3325	CONCENTRATION
3326	ACIDITY
3327	CONDUCTIVITY
3328	POWER
3329	POWER_FACTOR
3330	DISTANCE
3331	ENERGY
3332	DIRECTION
3333	TIME
3334	GYROMETER
3335	COLOR
3336	GPS_LOCATION
3337	POSITIONER
3338	BUZZER
3339	AUDIO_CLIP

3340	TIMER
3341	ADDRESSABLE_TEXT_DISPLAY
3342	ON_OFF_SWITCH
3343	DIMMER
3344	UP_DOWN_CONTROL
3345	MULTIPLE_AXIS_JOYSTICK
3346	RATE
3347	PUSH_BUTTON
3348	MULTI_STATE_SELECTOR
3349	BITMAP
3350	STOPWATCH
3337	POSITIONER
3338	BUZZER
3339	AUDIO_CLIP
3340	TIMER
3341	ADDRESSABLE_TEXT_DISPLAY
3342	ON_OFF_SWITCH
3343	DIMMER
3344	UP_DOWN_CONTROL
3345	MULTIPLE_AXIS_JOYSTICK
3346	RATE
3347	PUSH_BUTTON

Appendix 2. Default IPSO Resources

ID	Name	Type
5500	DIGITAL_INPUT_STATE	Boolean
5501	DIGITAL_INPUT_COUNTER	Integer
5502	DIGITAL_INPUT_POLARITY	Boolean
5503	DIGITAL_INPUT_DEBOUNCE	Integer
5504	DIGITAL_INPUT_EDGE_SELECTION	Integer
5505	DIGITAL_INPUT_COUNTER_RESET	No type
5506	CURRENT_TIME	Time
5507	FRACTIONAL_TIME	Float
5508	MIN_X_VALUE	Float
5509	MAX_X_VALUE	Float
5510	MIN_Y_VALUE	Float
5511	MAX_Y_VALUE	Float
5512	MIN_Z_VALUE	Float
5513	MAX_Z_VALUE	Float
5514	LATITUDE	String
5515	LONGITUDE	String
5516	UNCERTAINTY	String
5517	VELOCITY	Opaque
5518	TIMESTAMP	Time
5519	MIN_LIMIT	Float
5520	MAX_LIMIT	Float
5521	DELAY_DURATION	Float
5522	CLIP	Opaque
5523	TRIGGER	No type
5524	DURATION	Float
5525	MINIMUM_OFF_TIME	Float
5526	MODE	Integer
5527	TEXT	String
5528	X_COORDINATE	Integer
5529	Y_COORDINATE	Integer
5530	CLEAR_DISPLAY	No type
5531	CONTRAST	Float
5532	INCREASE_INPUT_STATE	Boolean
5533	DECREASE_INPUT_STATE	Boolean
5534	COUNTER	Integer
5536	CURRENT_POSITION	Float
5537	TRANSITION_TIME	Float
5538	REMAINING_TIME	Float
5541	UP_COUNTER	Integer
5542	DOWN_COUNTER	
5543	DIGITAL_STATE	Boolean
5544	CUMULATIVE_TIME	Float

5545	MAX_X_COORDINATE	Integer
5546	MAX_Y_COORDINATE	Integer
5547	MULTI_STATE_INPUT	Integer
5548	LEVEL	Float
5550	DIGITAL_OUTPUT_STATE	Boolean
5551	DIGITAL_OUTPUT_POLARITY	Boolean
5600	ANALOG_INPUT_STATE	Float
5601	MIN_MEASURED_VALUE	Float
5602	MAX_MEASURED_VALUE	Float
5603	MIN_RANGE_VALUE	Float
5604	MAX_RANGE_VALUE	Float
5605	RESET_MIN_MAX_MEASURED_VALUES	No type
5650	ANALOG_OUTPUT_CURRENT_VALUE	Float
5700	SENSOR_VALUE	Float
5701	SENSOR_UNITS	String
5702	X_VALUE	Float
5703	Y_VALUE	Float
5704	Z_VALUE	Float
5705	COMPASS_DIRECTION	Float
5706	COLOUR	String
5750	APPLICATION_TYPE	Strin
5751	SENSOR_TYPE	String
5800	INSTANTANEOUS_ACTIVE_POWER	Float
5801	MIN_MEASURED_ACTIVE_POWER	Float
5802	MAX_MEASURED_ACTIVE_POWER	Float
5803	MIN_RANGE_ACTIVE_POWER	Float
5804	MAX_RANGE_ACTIVE_POWER	Float
5805	CUMULATIVE_ACTIVE_POWER	Float
5806	ACTIVE_POWER_CALIBRATION	Float
5810	INSTANTANEOUS_REACTIVE_POWER	Float
5811	MIN_MEASURED_REACTIVE_POWER	Float
5812	MAX_MEASURED_REACTIVE_POWER	Float
5813	MIN_RANGE_REACTIVE_POWER	Float
5814	MAX_RANGE_REACTIVE_POWER	Float
5815	CUMULATIVE_REACTIVE_POWER	Float
5816	REACTIVE_POWER_CALIBRATION	Float
5820	POWER_FACTOR	Float
5821	CURRENT_CALIBRATION	Float
5822	RESET_CUMULATIVE_ENERGY	No type
5823	EVENT_IDENTIFIER	String
5824	START_TIME	Float
5825	DURATION_IN_MIN	Float
5826	CRITICALITY_LEVEL	Integer
5827	AVG_LOAD_ADJ_PCT	String

5828	DUTY_CYCLE	Integer
5850	ON_OFF	Boolean
5851	DIMMER	Integer
5852	ON_TIME	Integer
5853	MULTI_STATE_OUTPUT	String
5854	OFF_TIME	Integer
5900	SET_POINT_VALUE	Float
5903	BUSY_TO_CLEAR_DELAY	Integer
5904	CLEAR_TO_BUSY_DELAY	Integer
5910	BITMAP_INPUT	Integer
5911	BITMAP_INPUT_RESET	No type
5912	ELEMENT_DESCRIPTION	String
5913	UUID	String

The type “No Type” does not contain an value.

Appendix 3. OAB Objects

ID	Name
33255	RTM_TIME
33256	RTM_MOISTURE
33257	RTM_LOCATION
33258	RTM_DEVICE_MANAGEMENT
33259	RTM_RAIN
33260	RTM_EVENT
33261	RTM_VOLUME
33262	RTM_FLOW
33263	RTM_PIR
33264	RTM_WATER_LEVEL
33265	RTM_BLE
33266	RTM_PORTAL
33267	RTM_GENIBUS
33268	RTM_DALI
33269	RTM_OTA
33270	RTM_MODBUS
33271	RTM_MBUS

Appendix 4. Remoticom Resources

ID	Name	Type
26241	LOCATION_REQUEST	No type
26242	LOCATION	String
26243	REGISTER_DEVICE_TYPE	Integer
26244	ACTIVATE_STOCK_MODE	Boolean
26245	CELLULAR_NETWORK	Uint8
26246	SEND_INTERVAL	Uint32
26247	REGISTER_SERIAL_NUMBER	String
26248	BATTERY_VOLTAGE	Float
26249	DEVICE_MODE	Uint8
26250	RAIN_METER_PULSE	Uint16
26251	TILT	Int16
26252	OPERATOR_CODE	Uint32
26253	CHANGE_NETWORK_REQUEST	Uint8_t
26254	SERIAL_NUMBER_REQUEST	No type
26256	IP	String
26257	ICCID	String
26258	REBOOT_REASON	Uint8
26259	RESTARTS	Uint16
26260	FIRMWARE_VERSION	Uint32
26261	IP_INT	Uint32
26275	DEVICE_ORIENTATION	Uint8
26276	COUNT	Uint32
26277	TRIGGER	No type
26278	SEND_TIME	Uint16
26279	BLE_DATA	String
26280	RSSI_PORTAL	uint8
26500	TEXT_SPARE	String
26501	TEXT_PRODUCT_NR	String
26502	TEXT_SERIAL_NR	String
26503	TEXT_TYPE_KEY	String
26515	FLOW_DOSING_CAP	Uint32
26516	VOLUME_COUNTER	Uint32
26517	PULSE_COUNTER	Uint32
26518	POWER_ON_TIME	Uint32
26519	OPERATING_TIME	Uint32
26520	SERVICE_COUNT	Uint32
26530	BACKLIGHT	Uint8
26531	CONTROL_MODE	Uint8
26532	WARNING	Uint8
26533	ALARM	Uint8
26534	EVENT_LOG_CODE	Uint8
26550	PULSE_DOSING	Uint32

26551	ANA_IN_CAP_LOW	Uint32
26552	ANA_IN_CAP_HIGH	Uint32
26560	ANA_IN_CUR_LOW	Uint16
26561	ANA_IN_CUR_HIGH	Uint16
26570	FLOW_SETUP	Uint8
26571	MAX_PRESSURE	Uint8
26572	ANTI_CAVITATION	Uint8
26573	AUTO_DEAERATING	Boolean
26574	PULSE_MEMORY	Boolean
26630	VOLUME_COUNTER_MIN	Uint16
26631	VOLUME_COUNTER_MAX	Uint16
26632	PULSE_COUNTER_MIN	Uint16
26633	PULSE_COUNTER_MAX	Uint16
26634	PRESSURE_MIN	Uint8
26635	PRESSURE_MAX	Uint8
26636	PRESSURE_AVG	Uint8
26637	SWAP	Boolean
26649	GENIBUS_COMMAND	String
26651	DEVICE_TYPE	Uint16
26652	IMSI	String
26653	FIRMWARE_VERSION_STR	String
26654	ERROR_COUNT	Uint16
26655	DURATION	Uint16
26656	DIAGNOSTIC_CODE	Uint32
26657	TIMEZONE	Int8
26658	TIMEZONE_REQUEST	No type
26659	DST_ENABLED	Bool
26660	DST_ENABLED_REQUEST	No Type
26662	PLANNING	String
26663	ERROR_CODE	Uint16
26664	TEMPERATURE	Uint8
26665	POWER	Uint16
26666	CURRENT	Uint16
26667	ENERGY	String
26668	LEVEL	Uint8
26669	INFO	String
26670	REQUEST	No type
26671	EMERGENCY	Uint32
26672	ACK_TOKEN	Uint32
27000	VALUE_UINT8	Uint8
27001	VALUE_INT8	Int8
27002	VALUE_UINT16	Uint16
27003	VALUE_INT16	Int16
27004	VALUE_UINT32	Uint32

27005	VALUE_INT32	Int32
27006	VALUE_FLOAT	Float
27007	VALUE_BOOL	Bool
27008	VALUE_STRING	String
27009	REQ_VALUE	NoType
27010	REQ_RESET	NoType
28000	REG_ADDR_UINT8	Uint8
28001	REG_ADDR_UINT16	Uint16
28002	REG_ADDR_UINT32	Uint32
29000	SET_ERROR	NoType
29001	RESET_ERROR	NoType
29002	REQ_ACTION	NoType

The type “No Type” does not contain an value.