ineo·sense
BRINGING SENSE TO WIRELESS

ACS-REPORT-NOTE

Technical documentation

Summary

Revisions

Date	Author	Version	Comment	Minimum firmware
29/06/2022	FRR	1.0	1st version	01.06.0D
04/07/2022	KHN	1.1	Enhancement	01.06.0D
23/08/2022	FRR	1.2	Adding push button behavior	01.06.0D

1 Main features

ACS-Report-Note is intended to be used on different system that requires to print information on a screen. The product is able to draw simultaneously several information on the screen: Text with 2 different font size, highlighted or not (color inversion) and a QR Code.

1.1 Display features

2 types of ACS-Report-Note exist:

		
Name	ACS-Report-Note 2.13p Disp+Button	ACS-Report-Note 2.66p Full display
Resolution	250 x 122 pixels	296x152 pixels
Size	2.13p	2.66p
Button	Yes (button push notified by a LoRaWAN frame)	No
Available characters	ASCII Characters: index 22 to126	

Display constraint: temperature.

The refresh time of the screen varies between 3 and 10s depending on the ambient temperature.

The tests carried out give the following refresh times:

Temperature< 0°C	No refreshment
Temperature = 0°C to 15°C	Refreshment time can rise to more than 10s but decreases as the temperature rises
Temperature > 15°C	Refreshment time of about 3 to 4s

1.2 Reed sensor behavior

The couple, reed sensor and magnet, serves one purpose in our device: To do a LoRaWAN JOIN

When magnet is detected in front of the embedded reed relay, the following phases are processed.

Notice that ACS-Report-Note does not react to all phases, see details here below.

Phase 0 ..... **Duration:** 200ms
LED indication: nothing
Actuator change is ignored the first 200ms in order to avoid intempestive errors

Phase 1 ..... **Duration:** Runs 3 secs
LED indication: Red LED blinks 50ms each 500ms
If the actuator is released during this phase, the application can trig an action

Phase 2 ..... **Duration:** Runs 3 secs more
LED indication: Red LED blinks 50ms each 200ms
If the actuator is released during this phase, ACS-Report-Note resets its internal counters and sends an event.

Phase 3 ..... **LED indication:** After these 5 sec, installation phase, like LoRaWAN JOIN is the following description
LED indication: Red LED shines
If the actuator is not released in the next 5sec, the application can manage an error notification and ignore the action.
If the actuator is released in the next 5sec, Installation process is launched.

Installation phase is managed according to the desired connectivity configured in INST_MODE which will be used for sending the spontaneous frames. This can include LoRaWAN installation, Clover-Net installation and more. All required connectivity has to be confirmed to declare the device as installed.

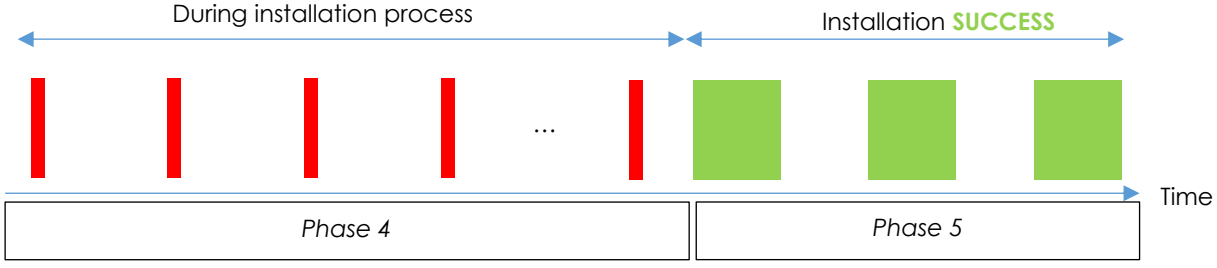
During Installation is in progress, b7 in DEV_STAT is set to 1.

LED indication is as described here below:

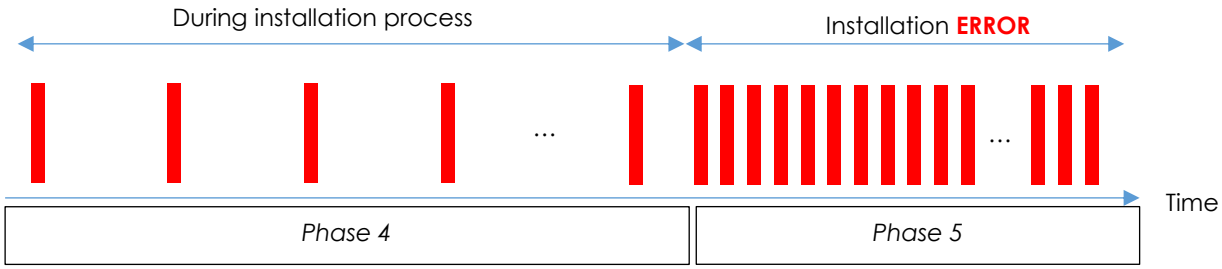
Phase 4 ..... Installation/JOIN in progress
Red and Green LED blink alternatively 100ms each 1sec

Phase 5 ..... Installation/JOIN result
- **SUCCESS**: Green LED blinks 1sec each 2sec 3 times [6sec]
- **ERROR**: Red LED blinks 100ms each 200ms 30 times [6 sec]

In case of success



In case of error

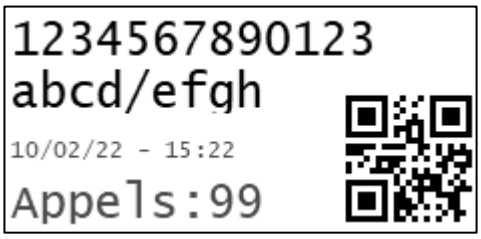


1.3 Push button behavior

The version with the smallest display is equipped with a button

Press this button sends an event frame (0x68 or 0x69) and increments the status counter 0 of this frame.

If you have chosen a display with a counter, it will increment.



2 Configuration

2.1 Default settings

LoRaWAN settings	
LoRaWAN Class	**A**
LoRaWAN Mode	**Public**
Activation	**ABP**
ADR	**Active**
DutyCycle	**Inactive**
Tx Power	**14dB**

Functional settings	
Event frame format	**Standard**
Periodic picture	**Standard every 1h**
Keep alive period	**SHORT every 72h**
Sensors mode source 1	**Button** (if it exists)

2.2 LoRaWAN downlinks

Standard LoRaWAN downlinks can be used to initialize or update ACS-Report-Note screen:

⚠

- LoRaWAN downlink is sent on **port 1**
- LoRaWAN Downlink cannot exceed **51 bytes**

2.3 CloverNet downlinks

Our CloverNet protocol can be used to manage ACS-Report-Note commands.

To do so, you will need to deploy CloverNet gateways only or Hybrid LoRaWAN/CloverNet gateways such as Multitech Conduit gateways.

CloverNet offers flexibility to setup our devices as:

- Maximum frame length is **198 bytes** instead of 51 bytes for LoRaWAN
- Downlinks can be pushed **immediately** without waiting for the device to send an uplink first

2.3.1 *MQTT Broker and Topics*

The complete documentation of our CloverNet protocol at the modem level (or CloverNet mCard) is available in the document: ***InS-INS_Modem-UserManual-E01.pdf*** *and* ***InS-mCardCloverNet-User_Guide_v1.1EN.pdf***

The format of the payload to be published so that it can be interpreted by our CloverNet application present in the gateway is as follows:

- **Header with communication parameters and product to address**
- Radio command prefix
- **Application** control that can be interpreted by the recipient product

2.3.2 *MQTT Command Publication*

Publication Topic: {{CloverMAC}}/CScommand/

Where : **CloverMAC** is the **CloverNet** mac number of the CloverNet gateway (format = AA:BB:CC:DD)

The following is the payload to use to send a command to an ACS-Report-Note device :

```
0104020A0D01180B03AAFF012901012A0101060206400001052701512801 0F100218C5010
D00AABBCCDD0000000000000000010202Command to send to device
```

Details :

Payload	Description	Documentation
0104020A0D01180B03AAFF012901012A0101060206400001052701512801 0F100218C5010D00AABBCCDD0000000000000000	Includes Radio Communication Settings for ACS-Report-Note and device serial number to reach: AABBCCDD	*InS-INS_Modem-UserManual-E01 Page 14, 38*
command with acknowledgment and response 010202 command with acknowledgment only 010201	Radio command prefix	
Command to send to device	ACS-Report-Note Command Description below	*ACS-Report-Note Technical documentation* (On progress)

2.3.3 *MQTT Subscription for answers*

Product answer: Order with acknowledgment and response

RxMode=Point-to-Point, QoS=-79Dbm, Congestion=0x00, RTC=21-11-08 15:05:20, NMac=AA:BB:CC:DD, Rep1 NONE, Rep2 NONE, ServiceType=0x00, ProductType=0x0033, payload=Command answer

Product Response: command with acknowledgment only

010302

If the product is unreachable, here is the answer that will appear on the answer topic 010303FEAABBCCDD

2.4 Screen initialization

To create your own display, see section

(0x19) – Full screen information printing

1234567890A/b

2.4.1 *LoRaWAN sample*

LoRaWAN Downlink data sample : size 39 bytes

1940030A902D0D31323334353637383930313233**20040020040D31323334353637383930412F62**

Downlink details :

	Label or content	**Frame concatenation**	**Element ID**
Header		19	**-**
QRCode	1234567890123	40030A902D0D31323334353637383930313233	**40**
Label 1	1234567890A/b	20040020040D31323334353637383930412F62	**20**

It is possible to show several labels on ACS-Report-Note screen. However, downlink size would increase and could not fit in a LoRaWAN downlink (51 bytes max). You must use CloverNet in this case.

2.4.1 *CloverNet sample*

Publication Topic: {{CloverMAC}}/CScommand/

Where : **CloverMAC** is the **CloverNet** mac number of the CloverNet gateway (format = AA:BB:CC:DD)

CloverNet Downlink data sample : (target device serial number = AABBCCDD)

0104020A0D01180B03AAFF012901012A0101060206400001052701512801 0F100218C5010D00AABBCCDD00000000000000000010202**1940030A902D0D31323334353637383930313233****20040020040D31323334353637383930412F62**

Downlink details :

	Label or content	**Frame concatenation**	**Element ID**
Prefix	CloverNet header	0104020A0D01180B03AAFF012901012A0101060206400010527015128010F100218C5010D00AABBCCDD00000000000000000010202	**-**
Command header		19	**-**
QRCode	1234567890123	40030A902D0D31323334353637383930313233	**40**
Label 1	1234567890A/b	20040020040D31323334353637383930412F62	**20**

2.5 Partial update

To do a partial update, see section (0x1A) – Partial update on screen

To refresh screen, you will need to use the correct element IDs according to the screen initialization.

2.5.1 *LoRaWAN sample*

Downlink command : size 16 bytes 1A200D633A4446323525656967392D33

		Frame concatenation	Element ID
Command header		1A	-
Label 1	c:DF25%eig9-3	200D633A4446323525656967392D33	20

Result:

c:DF25%eig9-3

2.5.2 *CloverNet sample*

Publication Topic: {{CloverMAC}}/CScommand/

Where : **CloverMAC** is the **CloverNet** mac number of the CloverNet gateway (format = AA:BB:CC:DD)

Sample topic : 01:38:65:45

CloverNet Downlink data sample : (target device serial number = AABBCCDD)

0104020A0D01180B03AAFF012901012A0101060206400001052701512801 0F100218C5010D00AABBCCDD00000000000000000010202 1A200D633A4446323525656967392D33

Downlink details:

	Element ID	Label or content	**Frame concatenation**
CloverNet Prefix	-	CloverNet header	0104020A0D01180B03AAFF012901012A0101060206400001052701 5128010F100218C5010D00AABBCCDD00000000000000000010202
Command header	-		1A
Label 1 update	**20**	1234567890A/b	20040020040D31323334353637383930412F62

Result:

c:DF25%eig9-3

3 Payloads

3.1 Event frames

REMINDER ***Allocated frame headers are 0x68, 0x69, 0x6A and 0x6B.***
The first 3 will be used for respectively short, standard and long frame type.
The forth one is available for any other special event frame format.
A device can support only some of these frame types, according to its specifications.

3.1.1 *[0x68] – Short event frame*

Frame format

FH	STATUS		TEMP	EVT_TYPE	EVT_DATA	OTOTx_info	
0	1.....2		3	4	…	…	
0x68	MSB	LSB				MSB	LSB

STATUS.....Status of the device and basic frame counter:

b15-12 are a basic spontaneous frame counter that overlaps each 16 spontaneous frame generated. This is typically used to detect frame repetition on system level.
b11-0 are a copy of the same bits of parameter DEV_STAT

TEMP.....Last measured temperature. Two's complemented signed byte formatted. Expressed in [degree Celsius]

EVT_TYPE.....Enumeration of event types. See the description table below.

EVT_TYPE	Description	EVT_DATA
0x01	High operating temperature alert	TEMP_DATA
0x02	Low operating temperature alert	
0x03	Operating temperature returned to normal range	
0x81	High application temperature alert	
0x82	Low application temperature alert	
0x83	Application temperature returned to normal range	
0x84	Application temperature sensor issue	
0x85	High application hygrometry alert	HYGRO_DATA
0x86	Low application hygrometry alert	
0x87	Application hygrometry returned to normal range	
0x88	Application hygrometry sensor issue	
0x89	State changed on source 1	SRC_DATA
0x8A	State changed on source 2	
0x8B	References initialized	REF_DATA
0x8C	Counters reset	CTR_RST_DATA
0x8D	Data error on source x	ERR_DATA
0x90	Critical error detected	CRITIC_ERROR_DATA

EVT_DATA.....Data related to the event. See the description table below.

TEMP_DATA – Size 4 bytes		
Byte 1 – Byte 4		
MSB	…	LSB
Temperature value expressed in 1/256th degree Celsius, Two's complemented		

HYGRO_DATA – Size 4 bytes		
Byte 1 – Byte 4		
MSB	…	LSB
Hygrometry value expressed in 1/256th %		

SRC_DATA – Size 4 bytes			
Byte 1	Byte 2 – Byte 4		
	MSB	…	LSB
b7-4: Previous state b3-0: New state	Counter of new state detections for given source on 3 bytes		

REF_DATA – Size 3 bytes		
Byte 1	Byte 2 – Byte 3	
	MSB	LSB
b7-4: Source 1 configuration b3-0: Source 2 configuration	References initialized as defined in (0x34) – Start references initialization	

CTR_RST_DATA – Size 1 byte	
b7-4	b3-0
Source 1 configuration	Source 2 configuration

ERR_DATA – Size 2 bytes	
Byte 1	Byte 2
b7-4: Source 1 configuration b3-0: Source 2 configuration	Source that triggered the error

CRITIC_ERROR_DATA – Size 5 bytes		
Byte 1	Byte 2	Byte 3 – Byte 5
Parameter CRITIC_ISSUE_CNT	0x01: Source 1 error 0x02: Source 2 error 0x03: BLE error	**Detail of error** If Source 1 or 2 error: depends on source type (see Appendix E: Description of errors depending on source) If BLE: parameter BLE_STAT

OTOTx_info .....Time between the moment the frame is generated and the moment of sending [expressed in seconds]
Occupies always the last 2 bytes in this type of frame
Thus, event calculated timestamp is: `reception time - OTOTx_delay`

3.1.2 *[0x69] – Standard event frame*

Frame format

FH	STATUS		TEMP	EVT_TYPE	EVT_DATA	OTOTx_info	
0	1.....2		3	4	…	…	
0x69	MSB	LSB				MSB	LSB

STATUS.....Status of the device and basic frame counter:

b15-12 are a basic spontaneous frame counter that overlaps each 16 spontaneous frame generated. This is typically used to detect frame repetition on system level.
b11-0 are a copy of the same bits of parameter DEV_STAT

TEMP.....Last measured temperature. Two's complemented signed byte formatted. Expressed in [degree Celsius]

EVT_TYPE.....Enumeration of event types. See the description table below.

EVT_TYPE	Description	EVT_DATA
0x01	High operating temperature alert	TEMP_DATA
0x02	Low operating temperature alert	
0x03	Operating temperature returned to normal range	
0x81	High application temperature alert	
0x82	Low application temperature alert	
0x83	Application temperature returned to normal range	
0x84	Application temperature sensor issue	
0x85	High application hygrometry alert	HYGRO_DATA
0x86	Low application hygrometry alert	
0x87	Application hygrometry returned to normal range	
0x88	Application hygrometry sensor issue	
0x89	State changed on source 1	SRC_DATA
0x8A	State changed on source 2	
0x8B	References initialized	REF_DATA
0x8C	Counters reset	CTR_RST_DATA
0x8D	Data error on source x	ERR_DATA
0x90	Critical error detected	CRITIC_ERROR_DATA

EVT_DATA.....Data related to the event. See the description table below.

TEMP_DATA – Size 4 bytes		
Byte 1 – Byte 4		
MSB	…	LSB
Temperature value expressed in 1/256th degree Celsius, Two's complemented		

HYGRO_DATA – Size 4 bytes		
Byte 1 – Byte 4		
MSB	…	LSB
Hygrometry value expressed in 1/256th %		

SRC_DATA – Size 44 bytes																	
Byte 1	Byte 2	Byte 3 – Byte 6			Byte 7 – Byte 10			Byte 11 – Byte 14			Byte 15 – Byte 18		
		MSB	…	LSB	MSB	…	LSB	MSB	…	LSB	MSB	…	LSB
b7-4: Previous state b3-0: New state	Source	Counter state 0			Counter state 1			Counter state 2			Counter state 3		

Byte 19 – Byte 22			Byte 23 – Byte 28			Byte 29	Byte 30 – Byte 44
MSB	…	LSB	MSB	…	LSB		
Counter state 4			Position (see description in Appendix D)			Hygrometry value expressed in %	• User data as defined in parameter USER_DATA

REF_DATA – Size 27 bytes																	
Byte 1	Byte 2 – Byte 3		Byte 4 – Byte 5		Byte 6 – Byte 20			Byte 21 – Byte 26			Byte 21 – Byte 26		
	MSB	LSB	MSB	LSB	MSB	…	LSB	MSB	…	LSB	MSB	…	LSB
b7-4: Source 1 configuration b3-0: Source 2 configuration	References initialized as defined in (0x34) – Start references initialization		Reception ordo ID as defined in parameter RCP_ORD_ID		User data as defined in parameter USER_DATA			Position source 1 (see description in Appendix D)			Position source 2 (see description in Appendix D)		

CTR_RST_DATA – Size 1 byte	
b7-4	b3-0
Source 1 configuration	Source 2 configuration

ERR_DATA – Size 2 bytes	
Byte 1	Byte 2
b7-4: Source 1 configuration b3-0: Source 2 configuration	Source that triggered the error

CRITIC_ERROR_DATA – Size 5 bytes		
Byte 1	Byte 2	Byte 3 – Byte 5
Parameter CRITIC_ISSUE_CNT	0x01: Source 1 error 0x02: Source 2 error 0x03: BLE error	**Detail of error** If Source 1 or 2 error: depends on source type (see Appendix E: Description of errors depending on source) If BLE: parameter BLE_STAT

OTOTx_info .....Time between the moment the frame is generated and the moment of sending [expressed in seconds]
Occupies always the last 2 bytes in this type of frame
Thus, event calculated timestamp is: `reception time - OTOTx_delay`

3.2 Periodic picture frames

REMINDER ***Allocated frame headers are 0x6C, 0x6D, 0x6E and 0x6F.***
The first 3 will be used for respectively short, standard and long frame type.
The forth one is available for any other special periodic picture frame format.
A device can support only some of these frame types, according to its specifications.

3.2.1 *[0x6C] – Short periodic picture frame*

Frame format

FH	STATUS		TEMP	S1_ST	S2_ST	S1_ST0	S2_ST0	S1_CTR	S2_CTR	ACT_PER
0	1.....2		3	4	5	6	7	8	9	10
0x6C	MSB	LSB								

STATUS.....Status of the device and basic frame counter:

b15-12 are a basic spontaneous frame counter that overlaps each 16 spontaneous frame generated. This is typically used to detect frame repetition on system level
b11-0 are a copy of the same bits of parameter DEV_STAT

TEMP.....Last measured temperature form Clover-Sense sensor
Two's complemented signed byte formatted

S1_ST .....Previous and current state of source 1:

b7-4.. previous state
b3-0.. current state

S2_ST .....Previous and current state of source 2:

b7-4.. previous state
b3-0.. current state

S1_ST0 .....Source 1 percentage of time passed in state 0 since last transmission. 0xFF means not allowed by current profile

S2_ST0 .....Source 2 percentage of time passed in state 0 since last transmission. 0xFF means not allowed by current profile

S1_CTR .....Source 1 counter of current state limited to 1 byte

S2_CTR .....Source 2 counter of current state limited to 1 byte

ACT_PER.....Activity percentage. Current device usage in % (0% = battery full)

3.2.2 *[0x6D] – Standard periodic picture frame*

Frame format

FH	STATUS		TEMP	S1_ST	ACT_PER	SRC1	S1_CTR0	S1_CTR1	S1_CTR2
0	1.....2		3	4	5	6	7.....10	11.....14	15.....18
0x6D	MSB	LSB							

S1_CTR3	S1_CTR4	S1_POS	HYGRO	USER_DATA	OTOTx_info	
19 22	23 26	27 32	33	34 48	49 50	
					MSB	LSB

STATUS.....Status of the device and basic frame counter:

b15-12 are a basic spontaneous frame counter that overlaps each 16 spontaneous frame generated. This is typically used to detect frame repetition on system level
b11-0 are a copy of the same bits of parameter DEV_STAT

TEMP.....Last measured temperature form Clover-Sense sensor
Two's complemented signed byte formatted

S1_ST .....Previous and current state of source 1:

b7-4.. previous state
b3-0.. current state

ACT_PER.....Activity percentage. Current device usage in % (0% = battery full)

SRC1.....Source 1 configuration

S1_CTRx .....Source 1 counters of different states

S1_POS.....Source 1 current position (see description in Appendix D)

HYGRO.....Hygrometry value expressed in %

USER_DATA .....User data as defined in parameter USER_DATA

OTOTx_info .....Time between the moment the frame is generated and the moment of sending [expressed in seconds]
Occupies always the last 2 bytes in this type of frame
Thus, event calculated timestamp is: `reception time - OTOTx_delay`

3.3 Keep alive frames

REMINDER ***Allocated frame headers are 0x78, 0x79, 0x7A and 0x7B.***
The first 3 will be used for respectively short, standard and long frame type.
The forth one is available for any other special keep-alive frame format.
A device can support only some of these frame types, according to its specifications.

NOTE ***Since any keep-alive frame type brings FW version, triggering on of these frame to the requester allow to get the FW version.***

3.3.1 *[0x78] – Short keep-alive frame*

Frame format

FH	RTC			BATT	CIF	FW_VER		OTOTx_delay	
0	1 4			5	6	7 8		9 10	
0x78	MSB		LSB			MSB	LSB	MSB	LSB

RTC.....Device RTC when the frame is delivered to the OTOTx service [in seconds since 01/01/2010
BATT.....Consumed battery level [%]
CIF.....Customer Information Field
FW_VER .....FW version [major.minor]
OTOTx_delay.... Time between the moment the frame is delivered to OTOTx service the moment of sending [expressed in seconds]
Thus, device RTC at the moment of the frame reception (more or less few seconds) is RTC + OTOTx_delay. occupies always the last 2 bytes in this type of frame

3.3.2 *[0x79] – Standard keep-alive frame*

Frame format

FH	RTC	BATT	CIF	FW_VER	FW_NB	SC_CFG	SC1_PER	SC1_MODE	SC1_CH
0	1 4	5	6	7 9	10.....11	12.....13	14..... 15	16	17
0x79	MSB FIRST			MSB FIRST	MSB FIRST	MSB FIRST	MSB FIRST		

SC1_SF	TX_PWR	LWAN TX_PWR	GBL_RST	PWR_RST	FRM_SENT	NRJ_DET	SCW_DET	FRM_RCV
18	19	20	21	22	23..... 24	25 26	27 28	29.....30
					MSB FIRST	MSB FIRST	MSB FIRST	MSB FIRST

DAY_PAST	CORE_FL	CORE_FLD	UR_TABLE0	UR_TABLE1	EXT_CH	RFU	OTOTx_delay
31 32	33 34	35.....36	37.....38	39 40	41	42 ..48	49 50
MSB FIRST	MSB FIRST	MSB FIRST	MSB FIRST	MSB FIRST			MSB FIRST

RTC .....Device RTC when the frame is delivered to the OTOTx service [in seconds since 01/01/2010]

BATT .....Consumed battery level [%]

CIF .....Customer Information Field

FW_VER.....FW version [major.minor.test_id]

FW_NB .....FW number

SC_CFG.....Clover-Net scan configuration

SC1_PER ....Clover-Net scan 1 period

SC1_MODE Clover-Net scan 1 mode

SC1_CH .....Clover-Net scan 1 channel

SC1_SF.....Clover-Net scan 1 LoRa Spreading Factor

TX_PWR.....Clover-Net current Tx Power in dBm

LWAN_TX_PWR LoRaWAN current power in dBm

GBL_RST.....Global number of resets

PWR_RST ....Number of power-on resets

FRM_SENT ..Number of frames sent

NRJ_DET.....Number of power detected in FSK and valid CAD in LoRa, expressed in x8

SCW_DET ...Number of syncword detected in FSK and valid header in LoRa

FRM_RCV...Number of frames received intended for this device

DAY_PAST..Number of days past since device was started

CORE_FL ....Internal Clover-Core flags

CORE_FLD..Internal Clover-Core dynamic flags

UR_TABLE0 .Number of unread logs in table 0

UR_TABLE1 .Number of unread logs in table 1

EXT_CH .....Number of known childs in Extender service (0x00 if not active)

RFU.....Reserved for Future Use

OTOTx_delay Time between the moment the frame is delivered to OTOTx service the moment of sending [expressed in seconds]
Thus, device RTC at the moment of the frame reception (more or less few seconds) is RTC + OTOTx_delay.
Occupies always the last 2 bytes in this type of frame

4 Downlinks : Commands

LoRaWAN command downlinks on port #1

4.1 Generic commands list

Frame header	Description
0x00	Trigger spontaneous frame
0x01	Read firmware version
0x03	Read parameters
0x04	Write parameters
0x17	Launch installation process
0x19	Full Screen initialization
0x1A	Partial screen information update

4.2 Generic commands details

4.2.1 *(0x00) - Trigger spontaneous frame*

This command allows to force sending one of the spontaneous frame. The desired frame is given by `FRAME` parameter which correspond to its frame header (one of those specified in section Spontaneous frames.

`TX_MODE` permits the select the way of sending between the mode described in section Communication modes for spontaneous frames.

NOTE ***This command has no limitation: if we ask for sending a frame which is longer than the size supported by the requested `TX_MODE`, nothing will happen since it is impossible to send it, but the reply will be OK if the device knows the requested `FRAME`.***

Request format

FH	FRAME	TX_MODE	DELAY MIN	DELAY MAX	CUSTOM_DATA
0	1	2	3	4	5 ..... n
0x00					

FRAME.....Frame header of the spontaneous frame we want to trig a sending

TX_MODE.....Mode used to send the requested frame
If 0xFF → the current configuration is used else, specify another mode (same definition as EVT_MODE, PP_MODE, PDL_MODE, PEL_MODE, KA_MODE, VS_MODE).

DELAY MIN & MAX Min and Max values in seconds used to set a random delay for sending the frame
If both 0xFF, uses the configurated values associated ot the frame type (`FRAME`)

CUSTOM_DATA..Specify application data to send. If left empty, application will fill buffer.

Reply format

FH	STATUS
0	1
0x80	

STATUS.....Request status:
0x00 = Sending will be processed
0xFF = Such a frame is not supported
0xFE = Such a tx mode is not supported
0xFD = Min delay must be lower or equal to max delay
0xFC = Frame triggering failed

4.2.2 *(0x01) – Read firmware version*

Firmware version reading request format

CMD	-
1 byte	-
0x01	

Firmware version reading answer format

ANS	APP_FW_NB	APP_FW_VER	RES_FW_NB	RES_FW_VER	BOOT_VER	REJ_OTA
1 byte	2 bytes	4 bytes	2 bytes	4 bytes	4 bytes	1 byte
0x81	Applicative fw number	Applicative fw version	Rescue fw number	Rescue fw version	Bootloader version	Rejected actions on firmware upgrade*

* Rejected Actions:

This filled was provided during the initialization of the RF service "firmware upgrade" (done automatically at the initialization of the product). It is used to inform the RF service "firmware upgrade" to reject some firmware upgrade session. Most of time when encryption is required on application, none crypt messages are all rejected to prevent attacks.

b5.....A Bootloader firmware upgrade will be rejected
b4.....A Rescue firmware upgrade will be rejected
b3.....A continue of the previous session (session in timeout) will be rejected
b2.....A firmware downgrade will be rejected
b1.....on Firmware reboot the EEPROM erasing will be rejected
b0.....A none crypt firmware upgrade session will be rejected

4.2.3 *(0x03) – Read parameters*

Request format

FH	NB_PARAM	P1_ID	P1-SIZE	...*	Pn_ID *	Pn_SIZE*
0	1	2	3	...	[1B]	[1B]
0x03						

NB_PARAM .....Number of parameters to be read

P1_ID .....ID of parameter 1 to read (same for Pn_ID)

P1_SIZE .....Size of the parameter 1 to read (same for Pn_SIZE)

Reply format

FH	NB_PARAM	P1_ID	P1_SIZE	P1_VALUE	…	Pn_ID*	Pn_SIZE*	Pn_VALUE*
0	1	2	3	[mB]		[1B]	[1B]	[oB]
0x83			m				o	

NB_PARAM .....Number of parameters read

P1_ID .....ID of parameter 1 read (same for Pn_ID)

P1_SIZE .....Size of the parameter 1 read (same for Pn_SIZE)

P1_VALUE.....Value of the parameter 1 read

NOTE ***In case of request format error, reply will be `8300FF`.***

4.2.4 *(0x04) – Write parameters*

Request format

FH	NB_PARAM	P1_ID	P1-SIZE	P1_VALUE	…*	Pn_ID *	Pn_SIZE*	Pn_VALUE
0	1	2	3	[mB]	…	[1B]	[1B]	[oB]
0x04			m				o	

NB_PARAM .....Number of parameters to be write

P1_ID .....ID of parameter 1 to write (same for Pn_ID)

P1_SIZE .....Size of the parameter 1 to write (same for Pn_SIZE)

P1_VALUE.....Value of the parameter 1 write

Reply format

FH	NB_PARAM	P1_ID	P1_STATUS	…	Pn_ID*	Pn_STATUS*
0	1	2	3		[1B]	[1B]
0x84						

NB_PARAM .....Number of parameters written

P1_ID .....ID of parameter 1 written (same for Pn_ID)

P1_STATUS.....Writing status same for Pn_SIZE):
00 = Writing success
FF = Writing error (see note below)

NOTE ***In case of param information error, its reply will be …`<Pn_ID>FF` and <Pn_VALUE> will be missing.***

4.2.5 *(0x04) – Write parameters by bit mask*

NOTE ***The frame header is the same as for the standard Write appli parameter command. The difference is that most significant bit in the parameter size is set to one. In such a case, this allows to insert the bit mask between this size and the param value.***

Request format

FH	NB_PARAM	P1_ID	P1-SIZE	P1_MASK	P1_VALUE	…	Pn_ID *	Pn_SIZE*	Pn_PASK*	Pn_VALUE
0	1	2	3	[mB]	[mB]	…	[1B]	[1B]	[oB]	[oB]
0x04			m with b7 set to 1					o with b7 set to 1		

NB_PARAM .....Number of parameters to be write

P1_ID .....ID of parameter 1 to write (same for **`Pn_ID`**)

P1_SIZE .....Size of the parameter 1 to write (same for **`Pn_SIZE`**) | 0x80
0x81 for 1 byte long, 0x82 for 2 bytes long…

P1_MASK.....Bit mask over the parameter. Only the bits masked at 1 will be updated in the paramter according to the correpsonding **`P1_VALUE`** bits

P1_VALUE.....Value of the parameter 1 write

Reply format

FH	NB_PARAM	P1_ID	P1_STATUS	…	Pn_ID*	Pn_STATUS*
0	1	2	3		[1B]	[1B]
0x84						

NB_PARAM .....Number of parameters written

P1_ID .....ID of parameter 1 written (same for **`Pn_ID`**)

P1_STATUS.....Writing status same for **`Pn_SIZE`**):
00 = Writing success
FF = Writing error (see note below)

NOTE ***In case of param information error, its reply will be …<Pn_ID>FF and <Pn_VALUE> will be missing.***

NOTE ***Standard param writing and bit mask writing can be merge in a single Write appli param command, depending on the b7 of each param size field***

4.2.6 *(0x19) – Full screen information printing*

This command is used to update the global content of the screen information currently visible. It consists of declaring the object to print (texts, QR codes or a date) by giving the coordinates of each element on screen. Each element characteristics declared in the request will be stored in a none volatile memory in

order to make possible the update of data only, without declaring again element characteristics. To Update Data the user must use the command **0x1A.**

Information for RTC mamangement:

It is possible for the user to declare in the screen creation an element Text_RTC in such case the format of element written must follow the structure of data described here:

Nb char = **16 bytes** (must be declared at 16 bytes for the element creation, the user will fix the value drawn on screen)

Auto generation of the RTC isn't possible with the creation command.

With command 0x1A (update screen): 2 cases:

1) It will be possible through the update RF command to provide the 16 bytes with the data of the updated RTC. In such case the distant user fix the value he want on screen.
2) It will be possible to provide a size equal to 0 to ask the device to draw it own Real time clock value.

Format of the Date and hour = xx/xx/xx - yy:yy

Request format

FH	Nature	Element characteristics	Position on screen	Data size	Datas	…	…	…
0	1	2	3…5	6	7…			
0x19	0x00 → reserved 0x20 → Text 0x40 → QR code 0x60 → Text RTC	0b'VVWX YZZZ'	0xXXXYYY With XXX→ right shift YYY→ Bottom shift	0xXX		Nature, elem char, position, size, data		

NATURE .....This field contains the nature of the object to draw on screen

b7-5 → 0 graphical object on next generation
..... 1 Text
..... 2 QR code
..... 3 Text RTC (auto format date and hour)
..... 4 – 7 … Reserved
b4-0 → Reserved

Element Characterisstics This field contains information on appearance of the object printed

b7-6 (VV) → Reserved
b5 (W) → "0" - Black / "1" – Red Depending on value the element will appear in Black or in Red
b4 (X) → center aligned for **Text only**. At "1" It aligned the text. Otherwise it will be left aligned.
b3 (Y) → High Light for **Text only**. At "1" It reverses the color and draw a scare arround the text. The text appears in white in this case.
b2-0 (ZZZ) → object size, in case of Text the font siz
..... 001 → Courrier New font **12** pix high
..... 100 → Courrier New font **24** pix high
..... 101 to 111 → Reserved
..... in case of QR Code the zoom factor:
..... 000 → ZOOM **x1** (NORMAL)
..... 001 → ZOOM **x1** (NORMAL)
..... 010 → ZOOM **x2** (MEDIUM)
..... 011 → ZOOM **x3** (HIGH)
..... 100 to 111 → Reserved

Position on screen This field contains the coordinates of the object to draw on the screen.

b23-12 (0xXXX) → X (Horizontal)coordinate of the element drawed on screen (from 0 to 296)

b11-0 (0xYYY) → Y (Vertical) coordinate of the element drawed on screen (from 0 to 152)

Data size..... Corresponds to the following data size.

Data .....This field contains the data to print on screen such ASCII text in case of text selection. Or an ASCII content in case of QR code information. Graphical object like a picture will start by the object resolution before the datas (Not yiet implemented in the current version)

Reply format in case of syntax error

FH	Status
0	1
0x99	0xFF → Error

Reply format otherwise

FH	Element 1 ID	Element 1 status	…	Element N ID	Element N status
0	1	2	…	(N*2) + 1	(N*2) + 2
0x99	0b'YYYX XXXX'	0x00 or 0xFF		0b'YYYX XXXX'	0x00 or 0xFF

ELEMENT x ID .....b7-5 (YYY) → represents the nature of the element saved in none volatile memory and printed on screen.

0..... graphical object on next generation
1..... Text
2..... QR code
3..... Text RTC (auto handled by application)
4 – 7 … Reserved

.....b4-0 (X XXXX) → reprensents the index number of the element taken into account on screen. From 0 to 31.

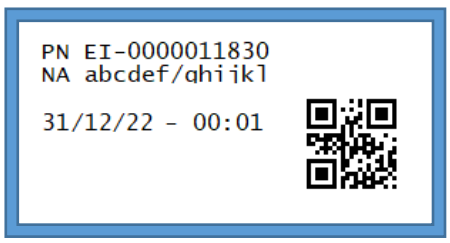
Request Example: Definition of the 3 elements on the screen: 1 text, 1 Text_RTC and one QR code.

0102021920020140142250 4E2045492D3030303030313133833300D0A4E41206162636465662F6768696A6B6C
6002014046103331 2F31322F3232202D2030303A303140010D2040093132333435363738 39

19 → RF command
200201401422504E2045492D3030303030313133833300D0A4E41206162636465662F6768696A6B6C → First Text on 2 lines carriege return code in included in the Text to return on the next line
6002014046103331 2F31322F3232202D2030303A3031 → Text that contains the date and hour
40010D2040093132333435363738 39 → QR Code

Associated answer:
010302 **99 2000 6000 4000**
99 → RF answer command
2000 → Text1 rightly taken in account on ID 0
6000 → Text_RTC rightly taken in account on ID 0
4000 → QR Code 1 rightly taken in account on ID 0

Must generate the folling screen:



4.2.7 (0x1A) – Partial update on screen

This command can only be used if there is already something printed on screen, generated by the report node over the command **0x19**. In such a case all element dimension are already defined and the user can easily recover the Element ID he needs to refresh.

This partial refresh command is useful to update only one or several object on the screen.

Request format

FH	Element 1 ID	Data size	Datas	…	…	…
0	1	2	3…			
0x1A	0b'YYYX XXXX'	0xXX		Element N ID, size, data		

ELEMENT ID .....This field contains the nature of the object to draw on screen

.....b7-5 (YYY) → represent the nature of the element saved in none volatile memory and printed on screen.

0..... graphical object on next generation
1..... Text
2..... QR code
3..... Text RTC
4 – 7 … Reserved

b4-0 (XXXX X) → reprensents the index number of the element referenced by the ACS-Report-Node. From 0 to 31.

Data size.....To be taken into account the data size must be the same as the one declared on command 0x38 execussion during the object definition. In particular case of Date_RTC this field could be set to 0 to generate an auto date calculation based on product itself (internal RTC)

Data .....This field contains the data to print on screen such ASCII text in case of text selection. Or an ASCII content in case of QR code information. Graphical object like a picture will start by the object resolution before the datas whatever if this information is allready known by the device (Not yiet implemented in the current version)

Reply format in case of syntax error

FH	Status
0	1
0x9A	0xFF → Error

Reply format otherwise

FH	Element 1 ID	Element 1 status	…	Element N ID	Element N status
0	1	2	…	(N*2) + 1	(N*2) + 2
0x9A	0b'YYYX XXXX'	0x00 or 0xFF		0b'YYYX XXXX'	0x00 or 0xFF

ELEMENT x ID .....b7-5 (YYY) → represents the nature of the element saved in none volatile memory and printed on screen.

0..... graphical object on next generation
1..... Text
2..... QR code
3..... Text RTC
4 – 7 … Reserved

.....b4-0 (X XXXX) → reprensents the index number of the element taken into account on screen. From 0 to 31.

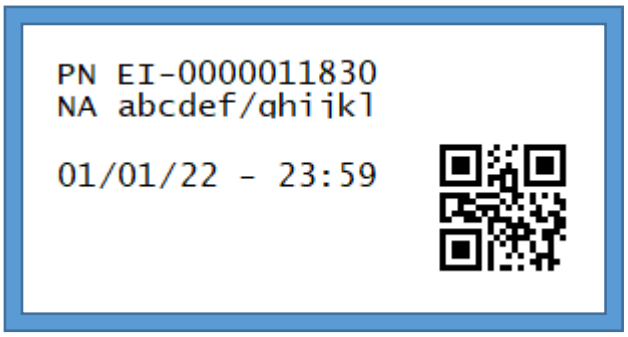
Request Example: Update of 2 elements on the screen: 1 text and one QR code.

010202 **1A 6000 4009313233343536373839**

1A → RF command
6000 → Updated text/RTC automatically by the product itself. It will change the date and hour based on current product RTC (Text/RTC index 0)
4009313233343536373839→ Updated QR Code data regenetared by the product (QR index 0)

Associated answer:
010302 **9A 6000 4000**
9A → RF answer command
6000 → Text2 on ID 1 rightly updated on screen
4000 → QR Code 1 on ID 0 rightly updated on screen

Must generate the following screen:



5 Downlinks : some samples

⚠ **LoRaWAN command downlinks on port #1**

5.1 Setup periodic picture period

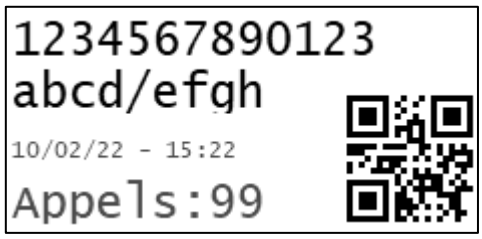
Request 04012D0205A0
LoRaWAN answer uplink 84012D00

05A0: Period expressed in multiple of 30 seconds
(see *Parameter section parameter 0x2D*) *05A0 (HEX format) = 1440 (Decimal format) → 12 hours*

5.2 Some complex samples of screen initialization

5.2.1 *Full update : ACS-Report-Note 2.13p with button*

For this example, we will use CloverNet protocol to initialize screens as it is necessary to have enough data to define all the elements.

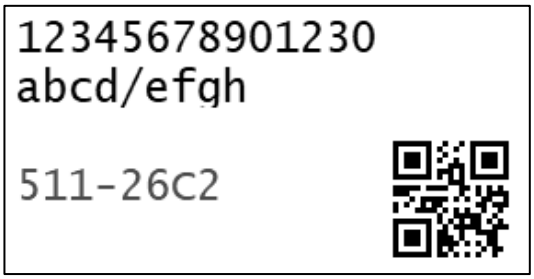


	Labels	Frame concatenation	Element ID to use for partial update
CloverNet Header		0104020A0D01180B03AAFF012901012A0101060206400010527015128010F100218C5010D00AABBCCDD00000000000000000010202	-
Command Header		19	-
QRCode	1234567890123	40 03 0A902D 0D 31323334353637383930313233	**40**
Text RTC	10/02/22 - 15:22	60 01 002046 10 31302F30322F3232202D2031353A3232	**60**
Label 1	1234567890123	20 04 002004 0D 31323334353637383930313233	**21**
Label 2	abcd/efgh	20 04 00201E 09 616263642F65666768	**22**
Label 3	99	20 04 07705A 02 3939	**23**
Label 4	Appels:	20 04 00205A 07 417070656C733A	**24**

Full frame:
0104020A0D01180B03AAFF012901012A0101060206400010527015128010F100218C5010D00AABBCCDD0
00000000000000000102021920040020040D31323334353637383930313233200400201E09616263642F656667
6840030A902D0D31323334353637383930313233600100204610313 02F30322F32322031353A323220202004
07705A023939200400205A07417070656C733A

5.2.2 *Full update : ACS-Report-Note 2.66p Full screen*

For this example too, we will use CloverNet protocol to initialize screens as it is necessary to have enough data to define all the elements.



		Frame concatenation	Element ID
CloverNet Header		0104020A0D01180B03AAFF012901012A0101060206400010527015128010F100218C5010D00AABBCCDD00000000000000000010202	-
Command Header		19	-
QRCode	1234567890123	40 03 0D3049 0D 313233343536373839303132 33	**40**
Label 1	1234567890123	20 04 006004 0E 313233343536373839303132 3330	**20**
Label 2	abcd/efgh	20 04 00601F 09 616263642F65666768	**21**
Label 3	511-26C2	20 04 006054 08 3531312D32364332	**22**

Full frame:
0104020205010101 0D00C1000008000000000000000001020219200400600 40E313233343536373839303132 3330200400601F09616263642F656667684003 0D30490D313233343536373839303132332004006054083531 312D32364332

5.2.3 *Partial update : ACS-Report-Note 2.13p with button*

Let's imagine we want to update label 2 of the previous example.

The Element ID we want to update is Element ID = **21**

LoRaWAN Downlink command : 1A2109746573742F74657374

		Element ID	**Frame concatenation**
Command header		-	1A
Label 2	test/test	21	**21**09746573742F74657374

CloverNet Downlink command : (target device serial number = AABBCCDD)

0104020A0D01180B03AAFF012901012A0101060206400001052701512 8010F100218C5010D00AABBCCDD00000000000000001A2109746573742F74657374

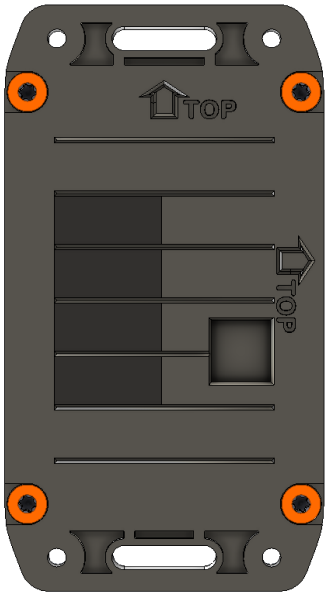
		Element ID	**Frame concatenation**
CloverNet header		-	0104020A0D01180B03AAFF012901012A0101060206400001052701512 8010F100218C5010D00AABBCCDD00000000000000000010202
Command header		-	1A
Label 2	test/test	21	2109746573742F74657374

6 Battery replacement and initialization

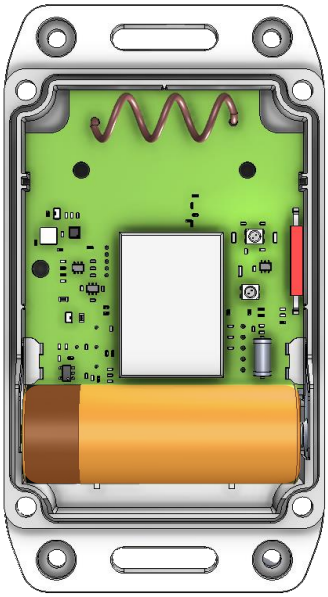
6.1 Battery replacement

Battery reference: FANSO ER18505M

Unscrew the cover fixing screws using Torx T15 screwdriver



Replace the battery with a new one



6.2 Battery level initialization

LoRaWAN downlinks commands on port #1

Battery level initialization is done through a LoRaWAN downlink after replacing the battery

Request	15011104000000000
LoRaWAN answer uplink	95011100

7 Parameters

Since many parameters are linked to generic features like spontaneous sendings, parameters are splitted into 2 different ranges.

- 0x01 to 0x7F are allocated to generic parameters
- 0x81 to 0xFF are allocated to applicative parameters

Parameter types according way of storing are:

xxx-P.....Persistent parameters - current value is stored in EEPROM and loaded on reset
xxx-V.....Volatile – on reset default parameter is loaded
xxx-S.....Signature – Signature signed parameters
xxx-D.....Battery Clear – Parameters values are not affected on Load Default. Values are set to 0 on battery initialization

Parameter types according way of access are:

RO-x.....Read only parameters – can be read, can't be modified
RW-x.....Read/Write parameters – can be read, can be written
TRWx-x.....Time Slot Read/W parameters – Writing application parameter is done according RW/RWW type. High and Low Time Slot parameters copies are accessed using service 0x01 commands 0x21/0x22 (Read/Write) for Low activities time slots and 0x23/0x24 (Read/Write) for High activities time slots

7.1 Generic parameters list

7.1.1 General parameters

Param ID	Name	Size	Description
0x00	**GEN_PAR_SGNT** [RO-V]	4	**Generic parameters signature** Parameter signature computed over all generic parameters stamped xxx-S. ***Default value:*** *0x00000000 (initialized at startup)*
0x01	**CIF** [RW-PS]	1	**Customer Information Field** Arbitrary register that will be brought by Keep-Alive frame. ***Default value:*** *0x00 (00)*
0x02	**GFN_EN** [RW-PS]	2	**Generic function enabler** Permits to enable generic function on the device. b15...Protected parameters writing authorized b14...915MHz RF range settings in Standby mode b13-6 reserved b5 ....Actions by reed enabled in operating mode b4 ....Actions by reed enabled in standby mode b3 ....Reserved b2 ....Time Slot service enable b1 ....RTC synchronization enable b0 ....Standby active ***Default value:*** *0x0013 (reed in stby, RTC synchronization and stby enabled)*

0x03	**DEV_STAT** [RO-P]	2	**General Device Status** b15 ..Device connected on Clover-Net b14 ..Device connected on LoRaWAN b13 ..Device connected on Sigfox b12...Application reserved b11...Oscillation detected on source 2 b10...Oscillation detected on source 1 b9 ....Application takes control over Clover-Net settings b8 ....Find device process running b7 ....Device installation in progress b6 ....Current state of Time Slot Service (0-Not Active, 1-Active) b5 ....Bad configuration / Bad status (see BCONF_STAT) b4 ....Device currently is in Test Mode b3 ....Temperature exceed operating limits b2 ....Battery usage exceeds low battery threshold (see LOW_BAT_TH) b1 ....Unread datalogging exceed Log table size (data lost) b0 ....RTC valid ***Default value:*** *0x0000 (all is OK)*
0x04	**FR_COUNT** [RO-P]	1	**Spontaneous frame counter** Incremented by the generic service 0x03 at each spontaneous frame generation, its 4 less significant bits are inserted in b15-12 of STATUS register (2nd byte) in all spontaneous frame. This is typically used for detecting frame repetition. The value returns to 0x00 after reaching 0xFF. ***Default value:*** *0x00 (0 frames sent)*
0x05	**CLR_MGT** [RO-V]	1	**Clear management** Clearing data like datalogging tables, applicative activity counters is there is. b7-3 reserved b2 ....Battery level initialization to full (self-cleared bit) b1 ....Clear Data Log table 1 (self-cleared bit) b0 ....Clear Data Log table 0 (self-cleared bit) ***Default value:*** *0x0000 (nothing requested)*
0x06	**LED_PER** [RW-PS]	3	**LED period and duration** (continuous alive blink) **[1 byte]** defines the continuous LED blink period (in seconds, 0x00 disables it). **[1 byte]** defines the continuous LED blink duration (in multiple of 50ms). **[1 byte]** defines the HW and number of blink: b7-4 Hardware used to indicate the low battery status (Appendix C) b3-0 Number of blinks (LED off duration is the same as LED on) ***Default value:*** *0x000111 (Continuous blink disabled)*
0x07	**INST_MODE** [RW-PS]	4	**Installation modes** b31...Blind (no com with distant equipment, join procedures still executed) b30-13 reserved b12...Sigfox b11-9 reserved b8 ....LoRaWAN b7-6 reserved b5 ....Clover-Net BCT bit field by order (ordo ID 1 is used) b4 ....Clover-Net BCT b3 ....Clover-Net MCT b2 ....Clover-Net P2P with BCT search (distant equipment research) b1 ....Clover-Net P2P with MCT search (distant equipment research) b0 ....Clover-Net P2P **Default value:** 0x80000100 (Blind mode, LoRaWAN)

0x08	**INST_PER** [RW-PS]	2	**Installation attempt period** Expressed in minutes ***Default value:*** *0x0005 (5 minutes period)*
0x09	**INST_NB** [RW-PS]	1	**Number of installation attempt** When requested by Launch installation process command ***Default value:*** *0x01 (1 installation attempt)*
0x0A	**CN_CONFIG** [RW-PS]	2	**Clover-Net configuration word** Corresponds to the Core param 0x10. In particular applications, this can be only default configuration and can be overridden by other params. ***Default value:*** *0x10CD*
0x68	**CN_PIN_CD** [RW-PS]	4	**Clover-Net PIN CODE** Pin code used to generate an AES128 Key pushed in core param 0x38. ***Default value:*** *0x31323334*

7.1.2 Event frame parameters

Param ID	Name	Size	Description
0x22	**EVT_TYPE** [RW-PS]	1	**Event frame type** Corresponds to the frame type described in section **Erreur ! Source du renvoi introuvable.**. 0x00 ...Disabled 0x01 ...Short event frame 0x02 ...Standard event frame 0x03 ...Long event frame 0x04 ...Special event frame ***Default value:*** *0x02 (Standard frame)*
0x23	**EVT_MODE** [RW-PS]	1	**Event frame sending mode** 0x00 ...Clover-Net P2P 0x01 ...Clover-Net MCT – no ACK 0x02 ...Clover-Net MCT –ACK 0x03 ...Clover-Net BCT – no ACK 0x04 ...Clover-Net BCT – ACK 0x05 ...Clover-Net Extender service – no ACK 0x06 ...Clover-Net Extender service – ACK 0x07 ...LoRaWAN unconfirmed 0x08 ...LoRaWAN confirmed 0x09 ...Sigfox – no ACK 0x0A...Sigfox - ACK ***Default value:*** *0x07 (LoRaWAN unconfirmed)*
0x24	**EVT_DEL1_RNG** [RW-PS]	2	**Event frame first sending random delay rang** Applied on the 1st frame sending only. Random delay computed in range from min to max: [1st byte] minimum, expressed in [seconds], value <= max [2nd byte] maximum, expressed in [seconds], min <= value NOTE: for repetition delay, see params CNET_DELn_RNG and OTHER_DELn_RNG ***Default value:*** *0x0000 (immediate sending)*

0x25	**EVT_REP** [RW-PS]	1	**Event frame repetition number** Applied whatever the sending mode is. Repetitions stop if ACK/confirmation is received. Corresponds to the number of sendings, not only repetitions). Max value: 10 ***Default value:*** *0x02 (2 sending)*
0x26	**EVT_EXT_TOUT** [RW-PS]	1	**Event frame extender timeout** ***Default value:*** *0x01 (1 minute)*
0x27	**EVT_PRTY** [RW-PS]	5	**Event frame priority configuration** NOTE: This is an advanced parameter to be managed by INEO-SENSE team. [1 byte] priority of group 1 [1 byte] priority of group 2 [1 byte] priority of group 3 [1 byte] priority of group 4 [1 byte] priority of group 5 Priority levels are: 0x00 ...High priority. If transmit list is full, remove the oldest low priority. If no low priority in list then frame is not buffered. 0x01 ...Low priority. If transmit list is full, remove the oldest low priority. If no low priority in list then frame is not buffered. 0x02 ...High priority. If transmit list is full, remove the oldest low priority. If no low priority in list then remove the oldest high priority. 0x03 ...Low priority. If transmit list is full, remove the oldest low priority. If no low priority in list then remove the oldest high priority. 0x04 ...High priority. If transmit list is full, frame is not buffered. 0x05 ...Low priority. If transmit list is full, frame is not buffered. ***Default value:*** *0x0000000000*

7.1.3 Periodic picture frame parameters

Param ID	Name	Size	Description
0x28	**PP_TYPE** [RW-PS]	1	**Periodic picture frame default type** Corresponds to the frame type described in section **Erreur ! Source du renvoi introuvable.**. 0x00 ...Disabled 0x01 ...Short periodic picture frame 0x02 ...Standard periodic picture frame 0x03 ...Long periodic picture frame 0x04 ...Special periodic picture frame ***Default value:*** *0x02 (Standard frame)*
0x29	**PP_MODE** [RW-PS]	1	**Periodic picture frame sending mode** 0x00 ...Clover-Net P2P 0x01 ...Clover-Net MCT – no ACK 0x02 ...Clover-Net MCT –ACK 0x03 ...Clover-Net BCT – no ACK 0x04 ...Clover-Net BCT – ACK 0x05 ...Clover-Net Extender service – no ACK 0x06 ...Clover-Net Extender service – ACK 0x07 ...LoRaWAN unconfirmed 0x08 ...LoRaWAN confirmed 0x09 ...Sigfox – no ACK 0x0A...Sigfox - ACK ***Default value:*** *0x07 (LoRaWAN unconfirmed)*
0x2A	**PP_DEL1_RNG** [RW-PS]	2	**Periodic picture frame first sending random delay rang** Applied on the 1st frame sending only. Random delay computed in range from min to max: **[1st byte]** minimum, expressed in [seconds], value <= max **[2nd byte]** maximum, expressed in [seconds], min <= value NOTE: for repetition delay, see params CNET_DELn_RNG and OTHER_DELn_RNG NOTE: for starting delay, see params PER_FR_START_DEL ***Default value:*** *0x000A (10 seconds delay)*
0x2B	**PP_REP** [RW-PS]	1	**Periodic picture frame repetition number** Applied whatever the sending mode is. Repetitions stop if ACK/confirmation is received. Corresponds to the number of sendings, not only repetitions). Max value: 10 ***Default value:*** *0x02 (2 frames sent)*
0x2C	**PP_EXT_TOUT** [RW-PS]	1	**Periodic picture frame extender timeout** ***Default value:*** *0x01 (1 minute)*
0x2D	**PP_PER** [RW-PS]	2	**Periodic picture sending period** Expressed in multiple of 30 seconds. Minimum 30 seconds, maximum 72 hours. ***Default value:*** *0x0078 (60 minutes)*

0x2E	**PP_PRTY** [RW-PS]	1	**Periodic picture frame priority configuration** NOTE: This is an advanced parameter to be managed by INEO-SENSE team. Priority level of periodic picture frames in OTOTx service: 0x00 ...High priority. If transmit list is full, remove the oldest low priority. If no low priority in list then frame is not buffered. 0x01 ...Low priority. If transmit list is full, remove the oldest low priority. If no low priority in list then frame is not buffered. 0x02 ...High priority. If transmit list is full, remove the oldest low priority. If no low priority in list then remove the oldest high priority. 0x03 ...Low priority. If transmit list is full, remove the oldest low priority. If no low priority in list then remove the oldest high priority. 0x04 ...High priority. If transmit list is full, frame is not buffered. 0x05 ...Low priority. If transmit list is full, frame is not buffered. ***Default value:*** *0x01*

7.1.4 Periodic datalogging frame parameters

Param ID	Name	Size	Description
0x2F	**PDL_TYPE** [RW-PS]	1	**Periodic datalogging frame default type** Corresponds to the frame type described in section **Erreur ! Source du renvoi introuvable.**. 0x00 ... Disabled 0x01 ... Short periodic datalogging frame 0x02 ... Standard periodic datalogging frame 0x03 ... Long periodic datalogging frame 0x04 ... Special periodic datalogging frame ***Default value:*** *0x00 (Disabled)*
0x30	**PDL_MODE** [RW-PS]	1	**Periodic datalogging frame sending mode** 0x00 ... Clover-Net P2P 0x01 ... Clover-Net MCT – no ACK 0x02 ... Clover-Net MCT –ACK 0x03 ... Clover-Net BCT – no ACK 0x04 ... Clover-Net BCT – ACK 0x05 ... Clover-Net Extender service – no ACK 0x06 ... Clover-Net Extender service – ACK 0x07 ... LoRaWAN unconfirmed 0x08 ... LoRaWAN confirmed 0x09 ... Sigfox – no ACK 0x0A .. Sigfox - ACK ***Default value:*** *0x07 (LoRaWAN unconfirmed)*
0x31	**PDL_READ** [RW-PS]	1	**Periodic datalogging reading mode** b7 ..... If set, logs marked as read only if frame reception confirmed (in case sending mode can be confirmed) b6-4 ... Unused b3-0 ... Log reading system: 0x0 ... Unread logs are sent from oldest on each periodic sending with more than one frame if necessary. 0x1 ... Unread logs are sent from oldest on each periodic sending fitting only one frame. 0x2 ... Only most recent unread logs are sent (from oldest) on each periodic sending fitting only one frame. In this case, unread logs value will be reset. ***Default value:*** *0x80*
0x32	**PDL_DEL1_RNG** [RW-PS]	2	**Periodic datalogging frame first sending random delay rang** Applied on the 1st frame sending only. Random delay computed in range from min to max: [1st byte] minimum, expressed in [seconds], value <= max [2nd byte] maximum, expressed in [seconds], min <= value NOTE: for repetition delay, see params CNET_DELn_RNG and OTHER_DELn_RNG NOTE: for starting delay, see params PER_FR_START_DEL ***Default value:*** *0x0000 (immediate sending)*
0x33	**PDL_REP** [RW-PS]	1	**Periodic datalogging frame repetition number** Applied whatever the sending mode is. Repetitions stop if ACK/confirmation is received. Corresponds to the number of sendings, not only repetitions). Max value: 10 ***Default value:*** *0x02 (2 frames sent)*
0x34	**PDL_EXT_TOUT** [RW-PS]	1	**Periodic datalogging frame extender timeout** ***Default value:*** *0x01 (1 minute)*

0x35	**PDL_PER** [RW-PS]	2	**Periodic datalogging sending period** Expressed in multiple of 30 seconds. Minimum 30 seconds, maximum 72 hours. ***Default value:*** *0x0078 (1 hour)*
0x36	**PDL_PRTY** [RW-PS]	1	**Periodic dataloging frame priority configuration** NOTE: This is an advanced parameter to be managed by INEO-SENSE team. Priority level of periodic picture frames in OTOTx service: 0x00 ... High priority. If transmit list is full, remove the oldest low priority. If no low priority in list then frame is not buffered. 0x01 ... Low priority. If transmit list is full, remove the oldest low priority. If no low priority in list then frame is not buffered. 0x02 ... High priority. If transmit list is full, remove the oldest low priority. If no low priority in list then remove the oldest high priority. 0x03 ... Low priority. If transmit list is full, remove the oldest low priority. If no low priority in list then remove the oldest high priority. 0x04 ... High priority. If transmit list is full, frame is not buffered. 0x05 ... Low priority. If transmit list is full, frame is not buffered. ***Default value:*** *0x01*

7.1.5 Periodic event list frame parameters

Param ID	Name	Size	Description
0x37	**PEL_TYPE** [RW-PS]	1	**Periodic event list frame default type** Corresponds to the frame type described in section **Erreur ! Source du renvoi introuvable.**. 0x00 ...Disabled 0x01 ...Short periodic datalogging frame 0x02 ...Standard periodic datalogging frame 0x03 ...Long periodic datalogging frame 0x04 ...Special periodic datalogging frame ***Default value:*** *0x00 (Disabled)*
0x38	**PEL_MODE** [RW-PS]	1	**Periodic event list frame sending mode** 0x00 ...Clover-Net P2P 0x01 ...Clover-Net MCT – no ACK 0x02 ...Clover-Net MCT –ACK 0x03 ...Clover-Net BCT – no ACK 0x04 ...Clover-Net BCT – ACK 0x05 ...Clover-Net Extender service – no ACK 0x06 ...Clover-Net Extender service – ACK 0x07 ...LoRaWAN unconfirmed 0x08 ...LoRaWAN confirmed 0x09 ...Sigfox – no ACK 0x0A...Sigfox - ACK ***Default value:*** *0x07 (LoRaWAN unconfirmed)*
0x39	**PEL_READ** [RW-PS]	1	**Periodic event list reading mode** b7.....If set, events marked as read only if frame reception confirmed (in case sending mode can be confirmed) b6-4....Unused b3-0....Event list reading system: 0x0 ...Unread events are sent from oldest on each periodic sending with more than one frame if necessary. 0x1 ...Unread events are sent from oldest on each periodic sending fitting only one frame. 0x2 ...Only most recent unread events are sent (from oldest) on each periodic sending fitting only one frame. In this case, unread events value will be reset. ***Default value:*** *0x02*
0x3A	**PEL_DEL1_RNG** [RW-PS]	2	**Periodic event list frame first sending random delay rang** Applied on the 1st frame sending only. Random delay computed in range from min to max: [1st byte] minimum, expressed in [seconds], value <= max [2nd byte] maximum, expressed in [seconds], min <= value NOTE: for repetition delay, see params CNET_DELn_RNG and OTHER_DELn_RNG NOTE: for starting delay, see params PER_FR_START_DEL ***Default value:*** *0x0000 (immediate sending)*
0x3B	**PEL_REP** [RW-PS]	1	**Periodic event list frame repetition number** Applied whatever the sending mode is. Repetitions stop if ACK/confirmation is received. Corresponds to the number of sendings, not only repetitions). Max value: 10 ***Default value:*** *0x02 (2 frames sent)*
0x3C	**PEL_EXT_TOUT** [RW-PS]	1	**Periodic event list frame extender timeout** ***Default value:*** *0x01 (1 minute)*

0x3D	**PEL_PER** [RW-PS]	2	**Periodic event list sending period** Expressed in multiple of 30 seconds. Minimum 30 seconds, maximum 72 hours. ***Default value:*** *0x0078 (1 hour)*
0x3E	**PEL_PRTY** [RW-PS]	1	**Periodic event list frame priority configuration** NOTE: This is an advanced parameter to be managed by INEO-SENSE team. Priority level of periodic picture frames in OTOTx service: 0x00 ...High priority. If transmit list is full, remove the oldest low priority. If no low priority in list then frame is not buffered. 0x01 ...Low priority. If transmit list is full, remove the oldest low priority. If no low priority in list then frame is not buffered. 0x02 ...High priority. If transmit list is full, remove the oldest low priority. If no low priority in list then remove the oldest high priority. 0x03 ...Low priority. If transmit list is full, remove the oldest low priority. If no low priority in list then remove the oldest high priority. 0x04 ...High priority. If transmit list is full, frame is not buffered. 0x05 ...Low priority. If transmit list is full, frame is not buffered. ***Default value:*** *0x01*

7.1.6 Keep Alive frame parameters

Param ID	Name	Size	Description
0x3F	**KA_TYPE** [RW-PS]	1	**Keep alive frame default type** Corresponds to the frame type described in section **Erreur ! Source du renvoi introuvable.**. 0x00 ...Disabled 0x01 ...Short keep alive frame 0x02 ...Standard keep alive frame 0x03 ...Long keep alive frame 0x04 ...Special keep alive frame ***Default value:*** *0x01 (Short keep alive frame sent)*
0x40	**KA_MODE** [RW-PS]	1	**Keep alive frame sending mode** 0x00 ...Clover-Net P2P 0x01 ...Clover-Net MCT – no ACK 0x02 ...Clover-Net MCT –ACK 0x03 ...Clover-Net BCT – no ACK 0x04 ...Clover-Net BCT – ACK 0x05 ...Clover-Net Extender service – no ACK 0x06 ...Clover-Net Extender service – ACK 0x07 ...LoRaWAN unconfirmed 0x08 ...LoRaWAN confirmed 0x09 ...Sigfox – no ACK 0x0A...Sigfox - ACK ***Default value:*** *0x07 (LoRaWAN unconfirmed)*
0x41	**KA_DEL1_RNG** [RW-PS]	2	**Keep alive frame first sending random delay rang** Applied on the 1st frame sending only. Random delay computed in range from min to max: **[1st byte]** minimum, expressed in [seconds], value <= max **[2nd byte]** maximum, expressed in [seconds], min <= value NOTE: for repetition delay, see params CNET_DELn_RNG and OTHER_DELn_RNG NOTE: for starting delay, see params PER_FR_START_DEL ***Default value:*** *0x000A (10 seconds delay)*
0x42	**KA_REP** [RW-PS]	1	**Keep alive frame repetition number** Applied whatever the sending mode is. Repetitions stop if ACK/confirmation is received. Corresponds to the number of sendings, not only repetitions). Max value: 10 ***Default value:*** *0x01 (1 frame sent)*
0x43	**KA_EXT_TOUT** [RW-PS]	1	**Keep alive frame extender timeout** ***Default value:*** *0x01 (1 minute)*
0x44	**KA_PER** [RW-PS]	2	**Keep alive sending period** Expressed in multiple of 30 seconds. Minimum 30 seconds, maximum 72 hours. ***Default value:*** *0x21C0 (72 hours)*

0x45	**KA_PRTY** [RW-PS]	1	**Periodic keep alive frame priority configuration** NOTE: This is an advanced parameter to be managed by INEO-SENSE team. Priority level of periodic picture frames in OTOTx service: 0x00 ...High priority. If transmit list is full, remove the oldest low priority. If no low priority in list then frame is not buffered. 0x01 ...Low priority. If transmit list is full, remove the oldest low priority. If no low priority in list then frame is not buffered. 0x02 ...High priority. If transmit list is full, remove the oldest low priority. If no low priority in list then remove the oldest high priority. 0x03 ...Low priority. If transmit list is full, remove the oldest low priority. If no low priority in list then remove the oldest high priority. 0x04 ...High priority. If transmit list is full, frame is not buffered. 0x05 ...Low priority. If transmit list is full, frame is not buffered. ***Default value:*** *0x01*

7.1.7 Device Integrity parameters

Param ID	Name	Size	Description
0x57	**DI_EN** [RW-PS]	2	**Device integrity event enabler** Allows to enable the devices integrity surveillance features - **b15-5 [r/w]- Reserved** - **b4** ***[r/w]*** **- REF_REINIT_EN** – Reinitialization of references. References initialization is always executed after an installation process but, if it was already done, it will be launched on new installation only if this bit is set - **b3** ***[r/w]*** **- MAG_EN** – Magnetic field change detection - **b2** ***[r/w]*** **- TILT_EN** - Tilt detection - **b1** ***[r/w]*** **- MS_EN** - Motion/Shock detection - **b0** ***[r/w]*** **- TEMP_EN** - Operating temperature exceed limits ***Default value:*** *0x0001 (operating temperature monitored)*
0x58	**DI_STAT** [RO-P]	2	**Device integrity event state** Gives the current status the devices integrity surveillance features - **b15** ***[r]*** **– MEMS_ACC_DET** – MEMS Accelerometer detected - **b14** ***[r]*** **– MEMS_MAG_DET** – MEMS Magnetometer detected - **b13** ***[r]*** **– TILT_REF_INIT** – Tilt reference set - **b12** ***[r]*** **– MAG_REF_INIT** – Magnetometer reference set - **b11-6** ***[r]*** **- Reserved** - **b4** ***[r]*** **- MAG_DET** - Magnetic field change detection - **b3** ***[r]*** **- TILT_DET** - Tilt detection - **b2** ***[r]*** **- MS_DET** – Motion/Shock detection - **b1** ***[r]*** **- TEMP_HIGH** - Operating temperature exceeds high limit - **b0** ***[r]*** **- TEMP_LOW** - Operating temperature exceeds low limit ***Default value:*** *0x0000 (nothing detected yet)*
0x59	**LOW_BAT_TH** [RW-PS]	1	**Low battery threshold** Defines the remaining battery percentage to activate low battery LED indication (in %, threshold is operated as <=) ***Default value:*** *0x05 (5% battery remaining trigger battery low event)*

0x5A	**LOW_BAT_PER** [RW-PS]	3	**LED low battery blink period** **[1 byte]** defines the continuous LED blink period (in seconds, 0x00 disables it). **[1 byte]** defines the continuous LED blink duration (in multiple of 50ms). **[1 byte]** defines the HW and number of blink: b7-4 Hardware used to indicate the low battery status (Appendix C) b3-0 Number of blinks (LED off duration is the same as LED on) ***Default value:*** *0x140112 (Low bat blink enabled, 2 blinks 50ms every 20 seconds)*
0x5B	**TEMP_L** [RW-PS]	2	**Temperature exceed - low Threshold** Temperature threshold used for operating temperature high limit detection based on Clover-Sense temperature sensor (+/- 2° precision) Expressed in [1/256th degree Celsius] ***Default value:*** *0xEC00 (-20°C)*
0x5C	**TEMP_H** [RW-PS]	2	**Temperature exceed - high Threshold** Temperature threshold used for operating temperature high limit detection based on Clover-Sense temperature sensor (+/- 2° precision) Expressed in [1/256th degree Celsius] ***Default value:*** *0x4600 (+70°C)*
0x5D	**TEMP_PER** [RW-PS]	1	**Temperature sampling period** Temperature sampling acquisition on the Clover-Sense sensor only. Expressed in [30 sec] ***Default value:*** *0x02 (1 min period)*
0x5E	**LAST_TEMP** [RO-V]	2	**Last Temperature value** Last acquired temperature value from Clover-Sense sensor. Expressed in [1/256th degree Celsius] ***Default value:*** *0x1900 (25°C)*
0x5F	**ACTIVITY_PERC** [RO-V]	1	**Activity percentage** Gives the battery consumed Expressed in [%] ***Default value:*** *0x00 (battery is full)*
0x69	**CORE_FL** [RO-P]	2	**Clover-Core internal flags** *Expert use only.* b15 .. A reset of transceiver has been forced b14 .. Stack of idle task has reached max b13 .. Stack of appli task has reached max b12 .. Stack of stack task has reached max b11-9Unused b8-7 ... Auto-transmit critical issue code 0x0 .No issue detected 0x1 .Unknown sending type 0x2 .Element in transmission lost 0x3 .Element in delay lost b6 ....Auto-transmit engine has reached max b5 ....Periodic auto-transmit engine has reached max b4 ....Stamping timer engine has reached max b3 ....Application timer engine has reached max b2 ....Stack timer engine has reached max b1 ....Application queue has reached max b0 ....Stack queue has reached max **Default value:** 0x0000

0x6A	**CORE_FLD** [RO-V]	2	**Clover-Core dynamic internal flags** *Expert use only.* b15-1Unused b0 ....Auto-transmit engine full **Default value:** 0x0000
0x6B	**CORE_STACKS_LVL** [RO-P]	6	**Clover-Core tasks stacks levels** *Expert use only.* **[2 bytes] STACK TASK** Current level of stack for stack task (remaining size in number of 32bits word) **[2 bytes] APPLI TASK** Current level of stack for appli task (remaining size in number of 32bits word) **[2 bytes] IDLE TASK** Current level of stack for idle task (remaining size in number of 32bits word) **Default value:** *Depends on project*

7.2 Application parameters list

Parameter types according way of storing are:

xxx-P.....Persistent parameters - current value is stored in EEPROM and loaded on reset
xxx-V .....Volatile – on reset default parameter is loaded
xxx-S.....Signature – Signature signed parameters
xxx-D .....Battery Clear – Parameters values are not affected on Load Default. Values are set to 0 on battery initialization

Parameter types according way of access are:

RO-x.....Read only parameters – can be read, can't be modified
RW-x.....Read/Write parameters – can be read, can be written
TRWx-x.....Time Slot Read/W parameters – Writing application parameter is done according RW/RWW type. High and Low Time Slot parameters copies are accessed using service 0x01 commands 0x21/0x22 (Read/Write) for Low activities time slots and 0x23/0x24 (Read/Write) for High activities time slots

7.2.1 *General parameters*

ID	NAME	Size	Description
0x80	**APL_PAR_SGNT** [RO-V]	4	**Application parameters Signature** Parameter signature computed over all parameters stamped xxx-S. ***Default value:*** *0x00000000 (initialized at startup)*
0x81	**SFN_EN** [RW-PS] *PROTECTED*	2	**Special Function enabler** b15 ..GRB led used else RGB led b14-7 reserved b6 ....Automatic deactivation activated on Source 1. Configured through AUTO_FILT_SRC1. Notified through b4 in APP_STAT b5-0 reserved ***Default value:*** *0x0040*
0x82	**FN_EN** [RW-PS]	2	**Function enabler** b15-14 reserved b13 ..Send event when hygrometry exceeds app thresholds b12 ..Send event when hygrometry goes back below app thresholds b11 ..Send event when temperature exceeds app thresholds b10 ..Send event when temperature goes back below app thresholds b9 ....Send event when source 2 switches to state 4 b8 ....Send event when source 2 switches to state 3 b7 ....Send event when source 2 switches to state 2 b6 ....Send event when source 2 switches to state 1 b5 ....Send event when source 2 switches to state 0 b4 ....Send event when source 1 switches to state 4 b3 ....Send event when source 1 switches to state 3 b2 ....Send event when source 1 switches to state 2 b1 ....Send event when source 1 switches to state 1 b0 ....Send event when source 1 switches to state 0 ***Default value:*** *0x0001*

0x83	**LED_EN** [RW-PS]	1	**LED enabler** b7-5 .reserved b4 .... Activate LED in test mode. If source 1 state = 0, red light on, else red light off. If source 2 state = 0, green light on, else green light off. b3 .... 2 short green blinks when source 2 switches to state n b2 .... 2 short red blinks when source 2 switches to state 0 b1 .... Short green blink when source 1 switches to state n b0 .... Short red blink when source 1 switches to state 0 **(Button pressed)** ***Default value :*** *0x01*
0x84	**BCONF_STAT** [RO-P]	1	**Bad configuration / Bad status** b7-3 .reserved b2 .... Display issue b1 .... SRC2 sensor issue b0 .... SRC1 sensor issue ***Default value:*** *0x00*
0xD4	**USER_DATA** [RW-P]	15	**User data field** This parameter is used to add optional data to some events and periodic frames. It can be used freely. **The 2 last bytes of this parameter are used to specify the Element ID and the size of the counter field on screen.** ***Default value:*** *0x00000000000000000000000000002302*
0xD6	**APP_STAT** [RO-P]	2	**Application Status** b15-5 reserved b6 .... Display has been initialized b5 .... unused b4 .... Source 1 currently filtered b3-0 reserved ***Default value:*** *0x0000*

7.2.2 *Sources parameters*

ID	NAME	Size	Description
0x90	**SRC1** [RW-PS] *PROTECTED*	1	**Source 1 configuration** *This is a PROTECTED parameter: can be written only if bit b7 of GFN_EN is set to one* 0x00... Disabled 0x02... Push Button ***Default value:*** *0x02*
0x91	**SRC2** [RW-PS] *PROTECTED*	1	**Source 2 configuration** *This is a PROTECTED parameter: can be written only if bit b7 of GFN_EN is set to one* 0x00... Disabled ***Default value:*** *0x00*
0x92	**STAT_SRC1** [RO-V]	1	**Source 1 current state** Current state of source 1 from 0x00 to 0x04. 0x00 means that device is not in any known position. Else value gives the current position ***Default value:*** *0x00*
0x93	**STAT_SRC2** [RO-V]	1	**Source 2 current state** Current state of source 1 from 0x00 to 0x04. 0x00 means that device is not in any known position. Else value gives the current position ***Default value:*** *0x00*

0x94	**PREV_STAT_SRC1** [RO-V]	1	**Source 1 previous state** Previous state of source 1 from 0x00 to 0x04. 0x00 means that device was not in any known position. Else value gives the previous position ***Default value:*** *0x00*
0x95	**PREV_STAT_SRC2** [RO-V]	1	**Source 2 previous state** Previous state of source 2 from 0x00 to 0x04. 0x00 means that device was not in any known position. Else value gives the previous position ***Default value:*** *0x00*
0x96	**CNT_STAT0_SRC1** [RO-V]	4	**Source 1 state 0 counter** Counter of state 0 detections for source 1 **This counter reflects the number of times button has been pressed. When written to 0, counter is updated on screen and RTC is cleared. If written to another values, counter is updated on screen and RTC is unchanged.** ***Default value:*** *0x00000000*
0x97	**CNT_STAT1_SRC1** [RO-V]	4	**Source 1 state 1 counter** Counter of state 1 detections for source 1 ***Default value:*** *0x00000000*
0x98	**CNT_STAT2_SRC1** [RO-V]	4	**Source 1 state 2 counter** Counter of state 2 detections for source 1 ***Default value:*** *0x00000000*
0x99	**CNT_STAT3_SRC1** [RO-V]	4	**Source 1 state 3 counter** Counter of state 3 detections for source 1 ***Default value:*** *0x00000000*
0x9A	**CNT_STAT4_SRC1** [RO-V]	4	**Source 1 state 4 counter** Counter of state 4 detections for source 1 ***Default value:*** *0x00000000*
0x9B	**CNT_STAT0_SRC2** [RO-V]	4	**Source 2 state 0 counter** Counter of state 0 detections for source 2 ***Default value:*** *0x00000000*
0x9C	**CNT_STAT1_SRC2** [RO-V]	4	**Source 2 state 1 counter** Counter of state 1 detections for source 2 ***Default value:*** *0x00000000*
0x9D	**CNT_STAT2_SRC2** [RO-V]	4	**Source 2 state 2 counter** Counter of state 2 detections for source 2 ***Default value:*** *0x00000000*
0x9E	**CNT_STAT3_SRC2** [RO-V]	4	**Source 2 state 3 counter** Counter of state 3 detections for source 2 ***Default value:*** *0x00000000*
0x9F	**CNT_STAT4_SRC2** [RO-V]	4	**Source 2 state 4 counter** Counter of state 4 detections for source 2 ***Default value:*** *0x00000000*

0xE8	**AUTO_FILT_SRC1** [RW-PS]	4	**Source 1 automatic filtering** **[2 bytes] Filtering trigger and features impacted** b15-8 unused b7.... Full source filtered (alarm sending and counting), else if not set, only alarm sending is filtered b6-2. unused b1 ..... Source filtered after other state detected b0..... Source filtered after state 0 detected **[2 bytes] Filtering duration** Filtering duration expressed in [s] ***Default value:*** *0x0082003C*

7.2.3 *REED and PUSH BOUTON sources parameters*

ID	NAME	Size	Description
0xA2	**REED_CONF** [RW-PS] *PROTECTED*	1	**REED and PUSH BOUTON configuration** *This is a PROTECTED parameter: can be written only if bit b7 of GFN_EN is set to one* b7-2... unused b1 ..... **[PUSH-BOUTON source]** Logic level used for state 0: 0 ..... Logic level LOW is state 0 (Button released) 1 ..... Logic level HIGH is state 0 (Button pushed) b0..... **[REED source]** Logic level used for state 0: 0 ..... Logic level LOW is state 0 (REED closed) 1 ..... Logic level HIGH is state 0 (REED opened) ***Default value:*** *0x02*
0xA3	**REED_FILTER** [RW-PS]	2	**REED input filtering** Filtering delay to avoid wrong detection on REED input. Expressed in [100 ms] ***Default value:*** *0x0001*
0xA4	**EXTREED_FILTER** [RW-PS]	2	**PUSH-BOUTON input filtering** Filtering delay to avoid wrong detection on PUSH-BOUTON input. Expressed in [100 ms] ***Default value:*** *0x0001*

8 General FAQ

8.1 Real Time Clock format

Real Time Clock (RTC) is organized as 4 Bytes second counter that counts seconds according 1st of January, 2010 00:00:00.