

SAM20 LoRaWAN Protocol FW v1.0

1. LoraWAN CONFIG Payload (Uplink)

Param:	stat	period	movt	ackco	dr	fid	pid	hw	fw	SUM
Size:	1B	1B	1B	1B	1B	1B	1B	1B	1B	9B

Parameter	Name	R/W	Size	Type	Default Value	Description
Status	stat	R	1B	uint8	0	Status Codes: 0 - OK Bit0 - Movement Detected Bit1 - Accelerometer Failure Bit2 - T/RH Sensor Failure Bit3 - NFC Failure Bit4 - EUI IC Failure Bit5 - AP Sensor Failure Bit6 - Wrong Battery Bit7 - Log Unavailable
Send Period	period	R/W	1B	uint8	15	Data send period in minutes
Movement Threshold	movt	R/W	1B	uint8	0	Movement threshold to send alert. (31.25 x movt mg, 0 = OFF, range: 1 - 63) 0 == OFF.
Packet Confirm	ackco	R/W	1B	uint8	24	Request confirmed packed every N transmissions. 0 == OFF.
Data Rate	dr	R/W	1B	uint8	128	Bit0-3 - DRx Bit7 - ADR status (0 = OFF, 1 = ON)
Family Id	fid	R	1B	uint8	3	Family Id.
Product Id	pid	R	1B	uint8	3	Product Id.
Hardware Version	hw	R	1B	uint8	2.0	Hardware version (hw / 10).
Firmware Version	fw	R	1B	uint8	1.0	Firmware version (fw / 10).

NOTE: For Config packet LoRaWAN Port 3 is used.

2. LoraWAN DATA Payload (Uplink)

Parameter:	stat	t	rh	ap	bat	SUM
Size:	0/1B	2B	2B	2B	2B	8/9

Parameter	Name	Range	Size	Type	Description
Status	stat	0 - 255	0/1B	uint8	Status Codes: 0x00 - OK Bit0 - Movement Detected Bit1 - Accelerometer Failure Bit2 - T/RH Sensor Failure Bit3 - NFC Failure Bit4 - EUI IC Failure Bit5 - Air Pressure Sensor Failure Bit6 - Wrong Battery Bit7 - Log Unavailable
Temperature	t	-327.68 - 327.67	2B	int16	Temperature (t / 100)
Relative Humidity	rh	0.00 - 100.00%	2B	uint16	Relative Humidity (rh1 / 100)
Air Pressure	ap	300 - 1200 mbar	2B	uint16	Air Pressure (ap / 10)
Battery Voltage	bat	0 – vbat mV	2B	uint16	Battery Voltage in mV

NOTES:

- for regular packet, LoRaWAN Port 2 is used.
- the status byte is only sent if any of the status modes is triggered.
- retransmitted packet parameters are only sent if packet retransmission is requested (downlink packet).

3. Data payload (uplink) if packet retransmitted

Parameter:	Normal data uplink	rfcnt	rstat	rrt	rrh	rap	rbat	SUM
Size:	8/9	3B	1B	2B	2B	2B	2B	20/21

Parameter	Name	Range	Size	Type	Description
Status	stat	0 - 255	0/1B	uint8	Status Codes: 0x00 - OK Bit0 - Movement Detected Bit1 - Accelerometer Failure Bit2 - T/RH Sensor Failure Bit3 - NFC Failure Bit4 - EUI IC Failure Bit5 - Air Pressure Sensor Failure Bit6 - Wrong Battery Bit7 - Log Unavailable
Temperature	t	-327.68 - 327.67	2B	int16	Temperature (t / 100)
Relative Humidity	rh	0.00 - 100.00%	2B	uint16	Relative Humidity (rh1 / 100)
Air Pressure	ap	300 - 1200 mbar	2B	uint16	Air Pressure (ap / 10)
Battery Voltage	bat	0 – vbat mV	2B	uint16	Battery Voltage in mV
Retransmitted Packet FCNT	rfcnt	0 - 16,777,215	3B	uint24	Retransmitted Packet Frame Counter
RP Status	rstat	0 - 255	1B	uint8	Status Codes: 0x00 - OK Bit0 - Movement Detected Bit1 - Accelerometer Failure Bit2 - T/RH Sensor Failure Bit3 - NFC Failure Bit4 - EUI IC Failure Bit5 - Air Pressure Sensor Failure Bit6 - Wrong Battery Bit7 - Log Unavailable
RP Temperature	rrt	-327.68 - 327.67	2B	int16	Temperature (rrt / 100)
RP Relative Humidity	rrh	0.00 - 100.00%	2B	uint16	Relative Humidity (rrh / 100)
RP Air Pressure	rap	300 - 1200 mbar	2B	uint16	Air Pressure (rap / 10)
RP Battery Volgate	rbat	0 – vbat mV	2B	unit16	Battery Voltage in mV

4. LoRaWAN CONFIG Payload (Downlink) – General setup

Param:	period	movt	ackco	dr	SUM
Size:	1B	1B	1B	1B	4B

Parameter	Name	R/W	Size	Type	Default Value	Description
Send Period	period	W	1B	uint8	15	Data send period in minutes
Movement Threshold	movt	W	1B	uint8	0	Movement threshold to send alert. (31.25 x movt mg, 0 = OFF, range: 1 - 63) 0 == OFF.
Packet Confirm	ackco	W	1B	uint8	24	Request confirmed packed every N transmissions. 0 == OFF.
Data Rate	dr	W	1B	uint8	128	Bit0-3 - DRx Bit7 - ADR status (0 = OFF, 1 = ON)

DEFAULT DOWNLINK PACKET: 0F 00 18 80

NOTE: For Config packet LoRaWAN Port 3 is used.

5. LoRaWAN CONFIG Payload (Downlink) - Send Period

Param:	period	SUM
Size:	1B	1B

Parameter	Name	R/W	Size	Type	Default Value	Description
Send Period	period	W	1B	uint8	15	Data send period in minutes

NOTE: For Config packet LoRaWAN Port 3 is used.

6. LoRaWAN CONFIG Payload (Downlink) – Move Threshold

Param:	period	SUM
Size:	2B	2B

Parameter	Name	R/W	Size	Type	Default Value	Description
Command	cmd	W	1B	uint8	6D	ASCII 'm'
Movement Threshold	movt	W	1B	uint8	0	Movement threshold to send alert. (31.25 x movt mg, 0 = OFF, range: 1 - 63) 0 == OFF.

NOTE: For Config packet LoRaWAN Port 3 is used.

7. LoRaWAN CONFIG Payload (Downlink) - Packet Retransmit Parameter

aram:	fcnt	SUM
Size:	3B	3B

Parameter	Name	R/W	Size	Type	Default Value	Description
Packet Retransmit	fcnt	W	3B	uint16	N/A	Packet f_cnt ID retransmit request.

NOTE: For Config packet LoRaWAN Port 3 is used.

8. LoRaWAN CONFIG Payload (Downlink) - Reboot

Param:	reboot	SUM
Size:	2B	2B

Parameter	Name	R/W	Size	Type	Default Value	Description
Reboot	reboot	W	2B	uint16	0xFFFF	Start REBOOT procedure.

NOTE: For Config packet LoRaWAN Port 3 is used.

9. LoRaWAN CONFIG Payload (Downlink) - Factory Defaults

Param:	fdef	SUM
Size:	2B	2B

Parameter	Name	R/W	Size	Type	Default Value	Description
Factory Defaults	fdef	W	2B	uint16	0xEEEE	Erase NFC EEPROM.

NOTE: For Config packet LoRaWAN Port 3 is used.

10.TTN Downlink Guide

[Overview](#) [Live data](#) [Messaging](#) [Location](#) [Payload formatters](#) [Claiming](#) [General settings](#)

[Uplink](#) [Downlink](#)

Schedule downlink

Insert Mode

☒ Replace downlink queue

☐ Push to downlink queue (append)

FPort *

Payload type

☒ Bytes ☐ JSON

Payload

The desired payload bytes of the downlink message

☐ Confirmed downlink

[Schedule downlink](#)

Application > End Device > Messaging > Downlink