SMARIS IoT Watchdog
payload description

LORA Dallas payload, **valid for FW version v.1.02**
Payload length = 50 bytes, all values in HEX

65ffffffffffffffff**10552203aaaa**28b84f970a000033**018f**280bcf960a000029**0198**ffffffffffffffffffffffffffffffff**80**ffff**

Byte 1:	Device FW version, 0x65 = 101 aka FW version 1.01	1 byte
Bytes 2 to 9:	RTC values, reserved for future use	8 bytes
Bytes 10 to 11:	SHT-31 humidity, raw sensor data	2 bytes
Bytes 12 to 13:	SHT-31 temperature, raw sensor data	2 bytes
Bytes 14 to 15:	SHT-31 status, reserved for future use	2 bytes
Bytes 16 to 23:	DALLAS 18B20, sensor 1, unique ID (0x28b84f970a000033)	8 bytes
Bytes 24 to 25:	DALLAS 18B20, sensor 1, temperature, raw sensor data	2 bytes
Bytes 26 to 33:	DALLAS 18B20, sensor 2, unique ID (0x280bcf960a000029)	8 bytes
Bytes 34 to 35:	DALLAS 18B20, sensor 2, temperature, raw sensor data	2 bytes
Bytes 36 to 47:	reserved for future use	12 bytes
Byte 48:	Device status byte	1 byte
Bytes 49 to 50:	reserved for future use	2 bytes

SHT-31 humidity and temperature calculation (Datasheet PDF link):

Relative humidity conversion formula (result in %RH):

$$RH = 100 \cdot \frac{S_{RH}}{2^{16} - 1}$$

Temperature conversion formula (result in °C & °F):

$$T[°C] = -45 + 175 \cdot \frac{S_T}{2^{16} - 1}$$

$$T[°F] = -49 + 315 \cdot \frac{S_T}{2^{16} - 1}$$

S_{RH} and S_T denote the raw sensor output for humidity and temperature, respectively. The formulas work only correctly when S_{RH} and S_T are used in decimal representation.

DALLAS 18B20 temperature calculation (Datasheet PDF link):

The DS18B20 output temperature data is calibrated in degrees Celsius; for Fahrenheit applications, a lookup table or conversion routine must be used. The temperature data is stored as a 16-bit sign-extended two's complement number in the temperature register (see Figure 4). The sign bits (S) indicate if the temperature is positive or negative: for positive numbers S = 0 and for negative numbers S = 1. If the DS18B20 is configured for 12-bit resolution, all bits in the temperature register will contain valid data. For 11-bit resolution, bit 0 is undefined. For 10-bit resolution, bits 1 and 0 are undefined, and for 9-bit resolution bits 2, 1, and 0 are undefined. Table 1 gives examples of digital output data and the corresponding temperature reading for 12-bit resolution conversions.

Operation—Alarm Signaling

After the DS18B20 performs a temperature conversion, the temperature value is compared to the user-defined two's complement alarm trigger values stored in the 1-byte T_H and T_L registers (see Figure 5). The sign bit (S) indicates if the value is positive or negative: for positive numbers S = 0 and for negative numbers S = 1. The T_H and T_L registers are nonvolatile (EEPROM) so they will retain data when the device is powered down. T_H and T_L can be accessed through bytes 2 and 3 of the scratchpad as explained in the *Memory* section.

Only bits 11 through 4 of the temperature register are used in the T_H and T_L comparison since T_H and T_L are 8-bit registers. If the measured temperature is lower than

	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
LS BYTE	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}	2^{-3}	2^{-4}
	BIT 15	**BIT 14**	**BIT 13**	**BIT 12**	**BIT 11**	**BIT 10**	**BIT 9**	**BIT 8**
MS BYTE	S	S	S	S	S	2^6	2^5	2^4

S = SIGN

Figure 4. Temperature Register Format

Table 1. Temperature/Data Relationship

TEMPERATURE (°C)	DIGITAL OUTPUT (BINARY)	DIGITAL OUTPUT (HEX)
+125	0000 0111 1101 0000	07D0h
+85*	0000 0101 0101 0000	0550h
+25.0625	0000 0001 1001 0001	0191h
+10.125	0000 0000 1010 0010	00A2h
+0.5	0000 0000 0000 1000	0008h
0	0000 0000 0000 0000	0000h
-0.5	1111 1111 1111 1000	FFF8h
-10.125	1111 1111 0101 1110	FF5Eh
-25.0625	1111 1110 0110 1111	FE6Fh
-55	1111 1100 1001 0000	FC90h

**The power-on reset value of the temperature register is +85°C.*

Device status byte:

0x80 - IoT Watchdog, device powered from external supply
0x40 - IoT Watchdog, device powered from the 3,7 V onboard battery