

CubeSat UWE-1

How to decode beacons from UWE-1?

One beacon signal from UWE-1 includes 33 data bytes, as in the following example:

Ex.:

Received

[53 01 1E **F0 25 F1 47 F4 39 F3 06 F1 05 F5 F0 F5 C4 FE CA FE C1 F5 A0 F5 B7 F5 CF** 00 01 02 1E 01 23]

Currents from solar cells
Temperature
Batteries
Temperature

$$\begin{aligned}
 I_{SolarCells} &= \frac{n}{8} [mA] \\
 Temp &= \frac{n-1000}{20} [^{\circ}C] \\
 V_{Bat} &= n [mV]
 \end{aligned}
 \tag{0.0.1}$$

, where “ n ” is a 12-bit binary number. (in the example above, replace the first “F” from the 16-bit binary number with “0”)

The first 3 bytes are a header, the next 10 include information about currents from solar cells, the next 4 are temperatures (main processor and respectively batteries), next 4 bytes are the voltages of the two batteries and the next 6 bytes are again temperatures (transceiver (PR430), top panel and bottom panel); the rest represents some internal configuration (chargers’ status, beacon timeout, etc.)

Ex:

“F0 25” → 0x25 (hexadecimal) → $n = 37$ → $I_1 = 4.6$ [mA] (this face is probably looking at the black space and therefore not generating current)

“F5 F0” → 0x5F0 (hexadecimal) → $n = 1520$ → Temp (processor) = 26 [°C]

“FE CA” → 0xECA (hexadecimal) → $n = 3786$ → $V_{Bat_1} = 3.786$ [V]