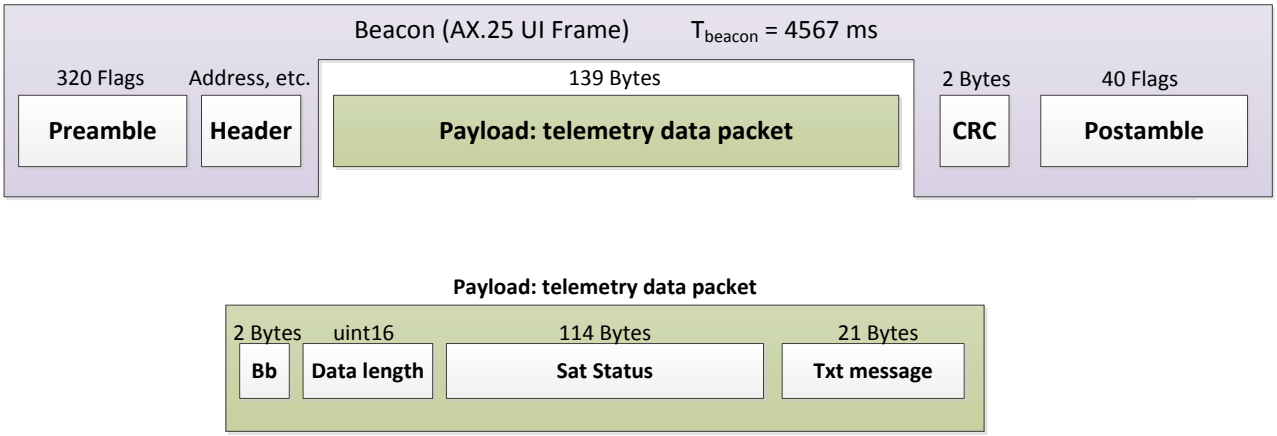
Digital data: Telemetry

Digital communication with Litsat-1 is based on Helium 100 (HE-100) transceiver.

In this document the beacon payload data is presented. For any other information you are very welcome to contact us: litsat@ktu.lt

Beacon RF packets are AX.25 UI frames (https://www.tapr.org/pub_ax25.html). Main parameters of the beacon frames are:

- TX baud rate 9600 bps
- Beacon repetition period 4567 ms
- Beacon duration ~0.5 s
- Source call address TNC
- Destination call address LY1LS



Beacon structure

The payload info field starts with the 2 header bytes "Bb"=0x4262 (**B**eacon **b**roadcast), followed by 2 bytes that indicate further data field length (should be 0x0087), then the sat status telemetry structure (114 bytes) and finishing with the short text message (21 bytes).

Sat status data structure

```
typedef struct {

    uint32_t Flight_Time_s;        // flight time [s]
    uint32_t Flight_Time_ms;       // flight time [ms]
    StatusCode lastErrorStatus;    // size=16 bytes
    uint16_t vbatt; // battery voltage [mV]
    uint16_t cursun; // Current from boost converters [mA]
    uint16_t cursys; // Current out of battery [mA]
    uint16_t curin[3]; // Solar cells current [mA]
    uint8_t P31u_outputs; // Status of EPS outputs
```

```
        float avrMagX;       // averaged magnetometer X axis data
        float avrMagY;       // averaged magnetometer Y axis data
        float avrMagZ;       // averaged magnetometer Z axis data

        // GPS- GLONAS receiver data
        double GPS_longitude;
        double GPS_lattitude;
        double GPS_altitude;
        double GPS_velocity;

        int16_t temperature_cpu;       // CPU temperature
        int16_t temperature_P31u;      // EPS temperature

        // min- max solar cell temperatures
        int16_t max_solar_cels_temp;    // over 30 s
        int16_t min_solar_cels_temp;    // over 30 s

        uint32_t counter_boot; // Number of EPS reboots
        uint8_t bootcause; //! Cause of last EPS reset

        uint8_t beacon_ON;   // beacon ON flag
        uint8_t RF_TX_ON;    // RF_TX_ON flag
        uint8_t startup_ON;  // startup sequence indication (NO RF)

        uint8_t test;
        uint8_t GPS_ON;      // GPS receiver ON=1, OFF=0
        // linear transponder status
        uint16_t Transponder_TimeR_s;  // linear transponder ON time in s
        uint8_t  Transponder_ON;       // linear transponder ON=1, OFF=0

        uint16_t photoSensorArray[6];   // photo sensor data array

} __attribute__((__packed__))  SAT_statusStr;  //size= 114 bytes
```