CARME NEARSPACE BALLOON SYSTEM

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REQUIREMENTS SPECIFICATION

1. INTRODUCTION

1.1.   Purpose

The purpose of this document is to outline the requirements for the Carme Nearspace Balloon System (CNBS). The system's purpose is to demonstrate that a cost-effective solution for short-term high altitude balloon launched missions can be sourced from commodity equipment. As a balloon-borne payload is, charitably, an irregular satellite, the project is named for Carme, the irregular moon of Jupiter.

1.2.   Project

Our goal is to build two Carme payloads, CNBS-1 and CNBS-2, both of which will be launched from weather balloons with parachute recovery. The system should provide, minimally, a human-receivable radio signal as well as a machine-receivable APRS digital signal. Both signals should provide the location and altitude of the payload to provide tracking and recovery.

1.3.   Features

The Carme system shall provide the following features:

- The system shall on a regular time interval not exceeding 2 minutes, broadcast its callsign and location via Morse code on the 70cm amateur radio band.
- The system shall on a regular time interval not exceeding 2 minutes, broadcast telemetry to the existing APRS telemetry network.

Via the APRS broadcast, interested parties shall be able to view the telemetry data through the HabHub Tracker website. To facilitate operations, the payload shall be waterproof and include a return system.

1.4.   References

- HabHub Tracker – http://tracker.habhub.org

2. FUNCTIONAL REQUIREMENTS

2.1.   Sensors

2.1.1. Positioning

The payload shall include a GPS receiver that shall allow the payload system to determine its location and altitude to within 1 meter.

2.2.   Interfaces

2.2.1. Serial

The device shall provide a serial interface for testing and configuration at runtime.

2.2.2. Radio Telemetry: APRS

The device shall provide APRS telemetry to ground based stations using the 70cm amateur radio band. Through the 70cm transmission, the APRS telemetry data will be available to the Internet through the HabHub Tracker website.

2.2.3. Radio Telemetry: CW

The device shall provide Morse-based telemetry over an audio channel on the 70cm amateur radio band.

3. OTHER REQUIREMENTS

3.1. Physical Requirements

3.1.1. Balloon

The device shall be launched using a helium balloon capable of carrying 1kg of payload until it bursts at its peak altitude.

3.1.2. Parachute Recovery

The payload shall be safely returned to the ground via a parachute recovery system after balloon burst.

3.2. Constraints

3.2.1. Weight

The payload system shall weigh less than 1 kilogram. Ideally, the payload shall weight less than 500 grams.

3.2.2. Waterproof

The payload system shall be sealed in a water-resistant container to allow for altitude and long-duration flight through hazardous weather conditions.

3.2.3. Operating Temperature

The payload shall operate at a temperature from -10 degrees Celsius through 50 degrees Celsius.

3.2.4. Altitude

The payload shall operate in a range of altitudes from 0 meters above sea level through 25,000 meters above sea level.

APPENDIX A: REVISION HISTORY

Version	Date	Author	Comment
1.0	April 28, 2016	James Howard	Initial specification