

Product Development Specification

William Harrington, Jake Heath, Saroj Bardewa,
Shan Quinney, Michael Mathis

ECE411

October 25, 2015

Customer requirements

The Portland State Aerospace Society (PSAS) needs a device that can be used for command, control, communications between a **CubeSat** and a **ground station**. A **CubeSat** is a miniature satellite that can be used for scientific research in space. It has a volume of one liter (10cm cube), and has a mass of no more than 1.33kg. A **ground station** is a radio station located on earth that is designed for communication with spacecraft. Development of such a device is not trivial as it will need to eventually be "space ready" and will require multiple phases of development.

The first phase of development will involve finding and de-risking a microcontroller that is capable of handling command, control, and communications. Therefore, the device at this point will be a communications module "break-out board" that will allow easy access to the features of the microcontroller like UART, I2C, SPI, etc.

Requirements

Must

- Be able to fit within the CubeSat form factor
(*no bigger than 10cm x 10cm x 10cm*)
- Be a breakout board
- Have access to UART
- Have access to I2C
- Have access to SPI
- Have access to GPIO
- Have a micro USB to serial adapter
- Be capable of RF communication between with another device across a 5-6ft gap
- Have visible indication of communication (*such as LEDs*)
- Have a bidirectional amplifier for RF communication

Should

- Be able to send/receive data packets via RF communication
- Be battery powered
- If battery powered, utilize USB for recharging

May

- Be capable of long distance communication (*Across campus for example*)
- Be capable of actual data transfer between two units over RF
- Be capable of operation in space (*e.g. really low temperatures*)

Performance

Functionality

- The device will have a transceiver for RF communications
- The device will have a micro-USB port for interfacing and charging
- The device will allow access to micro controller features via miscellaneous connectors such as .1-in pin headers

Economic

Energy

Environmental

Health and Safety

Legal

- The device must comply to ETSI and FCC regulatory requirements

Maintainability

Manufacturability

Operational

Political

Reliability and Availability

Social and Cultural

Usability