

# Product Development Specification

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

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## 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.

### 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 pins
- 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*)