Product Development Specification

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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 "breakout 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
- Have pre-amplifier on Rx side of RF circuit

Should

- Be able to send/receive commands 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)*