

From: Steve Borenstein

To: Behnam Ghaffari

Date: March 17, 2020

Subject: 0501-EX-ST-2020

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Message:

Mr. Ghaffari,

Thank you for your question. currently, CU is leading the research effort along with collaborators at University of Minnesota and Emory-Riddle University in Florida. The project is funded by the AFOSR Multidisciplinary Research Program of the University Research Initiative (MURI) grant. You can see info here: <https://www.colorado.edu/iriss/research/hyflits>.

The effort includes stratospheric balloon launches to 40km, which are being performed at various locations in the US, including the Rocky Mountains in Colorado, Minnesota, Florida, and in the Central Plains. The use of the STA and 442 process is new to us. I am hopeful that lessons learned from the STA application process will inform our 442 license application in the future. Ultimately, we're expecting to continue this research for a while, and use the one-way telemetry system for future high-altitude instruments.

A few notes that may help to inform this application:

- This application is based on a customized radio design using an OTS LoRa modulated radio module and power amplifier on the remote end. The module uses a digital based SDR which can be software controlled in frequency, bandwidth and output power.
- Our on-board electronics and firmware are at the early stages of development. It will be possible to limit the output power based on altitude, and/or change frequencies based on region, if that is necessary.
- Balloons will have the capability of traveling hundreds of miles.
- There are likely to be one or multiple, ground based directional receiver stations in use for a given flight. The aim of this license would be to minimize this with an increase of range and reliability of the telemetry.
- The modules we are considering are also available in other sub-gigahertz outputs. However, the initial targeted 400-500MHz range is ideal for mitigating free air path loss, minimizing output power and antenna size issues. That being said, 800-960MHz may be a viable option, as well.

I would be more than happy to discuss this project further, if there are additional questions. Either via written or voice correspondence.