Motivation

- How to increase scientific data returns from CubeSats?
- Experiences with RAX mission
  - SRI Science PI and west coast ground station
- Allen Telescope Array (ATA) underutilized

- Get a radio in the hands of many CubeSat developers that can better utilize the ATA
Radio Approach

- Targeting C-band
  - 4 GHz – 6 GHz

- Software defined transmitter

- Developing two modes
  - 1) High speed mode (5Mbps) – stretch of 10 Mbps
  - 2) Low speed mode (50 kbps)
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<tr>
<th>Frequency Range</th>
<th>Activity Type</th>
<th>Equipment Type</th>
<th>License Overview</th>
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Block Diagram

BASEBAND PROCESSOR (FPGA)

DATA/CONTROL/POWER

DC

COMPLEX BASEBAND

I/Q DAC

I-DAC

Q-DAC

RECONSTRUCTION FILTERS

LPF

LPF

I/Q MODULATOR

5.84 GHz LOCAL OSCILLATOR

1W AMPLIFIER

ANTENNA

CLOCK & DISTRIBUTION

PLO
Preliminary Interfaces

- **Data input**
  - SPI at up to 10 Mbps, 3.3V

- **Power input**
  - 3V to 12V
  - 5W – 7W active transmit
  - 1W – 2W standby

- **Volume**
  - 2cm x 8cm x 8cm
Modulations / Protocols

- What modulations/protocols to initially implement?

- Currently planning for:
  - QPSK
  - IP/UDP
  - Layer 2 ??

- Considering
  - Asynchronous CDMA
Status

- All parts procured and undergoing evaluation
- Prototype board this fall
  - CubeSat fit and function
- Looking for partners that would be willing to fly on their CubeSat mission
Thank You

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