CADRE

CubeSat Investigating Atmospheric Density Response to Extreme Driving

University of Michigan CHDC Presentation

April 19, 2012
CADRE Communications Snapshot

Low-rate Command Link
FSK, 9.6 kbps, No coding

High-rate Science Data Link
S-band
BPSK/QPSK, <1 Mbps, Reed-Solomon coding

Low-rate Health Link
UHF, 437 MHz
FSK, 9.6 kbps, No coding

Options:
Umich SRB Dish
Peach Mountain
Others

S-Band
Ground Station
Location TBD

UMich Yagi Antenna

Umich Ground Station
COM Overview

• Required science downlink rate of > 0.25 Mbps
  – WINCS payload drives requirement
• Radios
  – UHF: AstroDev Lithium-1
  – S-Band: Trade study (NRL Nimitz, Quasonix nanoTx)
• Ground station:
  – UHF: University of Michigan
  – S-Band: Trade study underway
• Antenna
  – UHF: Flexible stainless steel monopole antennas
  – S-Band: Custom circular polarized patch antennas
S-Band Licensing

• **Option 1: NTIA Licensed Science Research Band (2200 – 2290 MHz)**
  – Current configuration of NRL radio set to transmit at 2.2GHz
  – Uncertainty in ability to obtain license

• **Option 2: FCC Experimental License (3100 - 3300 MHz)**
  – Reviewing radio capability
  – Developing application package

• **Option 3: ISM Band (2400 - 2500 MHz)**
  – Can change registers in RF chip to transmit in ISM Band at 2.4GHz
  – Interference with WiFi and Bluetooth
    • Frequency survey underway to determine feasibility

Exploring Option 2 for FCC experimental license