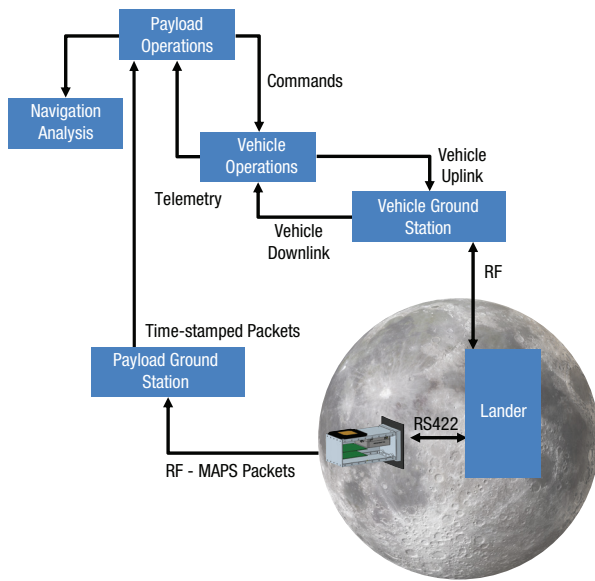
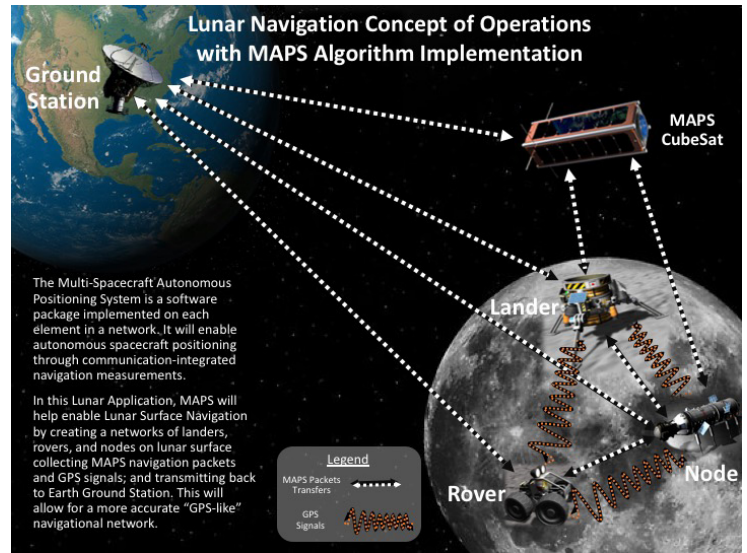


# Lunar Node-1 (LN-1) Navigation Beacon Payload

Implementation of a S-band Navigation Beacon for Lunar Applications using Cubesat Components with Multi-spacecraft Autonomous Positioning System. Payload Delivery in March 2020 for Potential Flight in 2021.



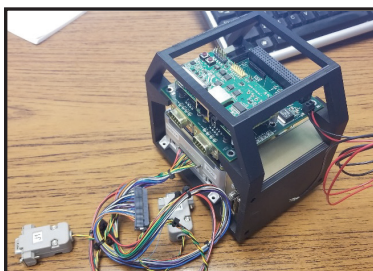
Concept of Operations



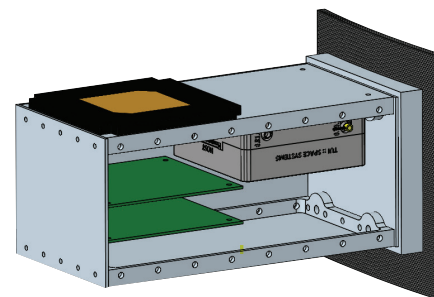
Large-scale Architecture

- **Goal:** Demonstrate navigation technologies to support local surface and orbital operations.
- **Why:** Need for local resources to support autonomous flight operations for precision landing and ascent on and around planetary bodies far from Earth.  
Payload could also act as future communications relay for supporting extended operations.
- **How:** Implement Multi-spacecraft Autonomous Positioning System (MAPS) using cubesat flight hardware to support future missions.
- **Objectives:** Evaluate communication-based navigation in deep space application. Demonstrate potential of SDR-based platform to support other navigation capabilities for in-situ operations, i.e., radio direction finding via ground testing.

- **Radiation Hard FPGA-based Controller**
- **Tethers Unlimited SWIFT-SDR for Earth communication**
- **Space Chip-Scale Atomic Clock for high accuracy timing**
- **1.8 kg, 10 × 10 × 20 cm**
- **13 W average, 22 W peak**
- **Any landing site, any landing platform**
- **Modular design for integrated into a variety of platforms**



Prototype



LN-1 Design

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