

ChargerSat-1 C&DH

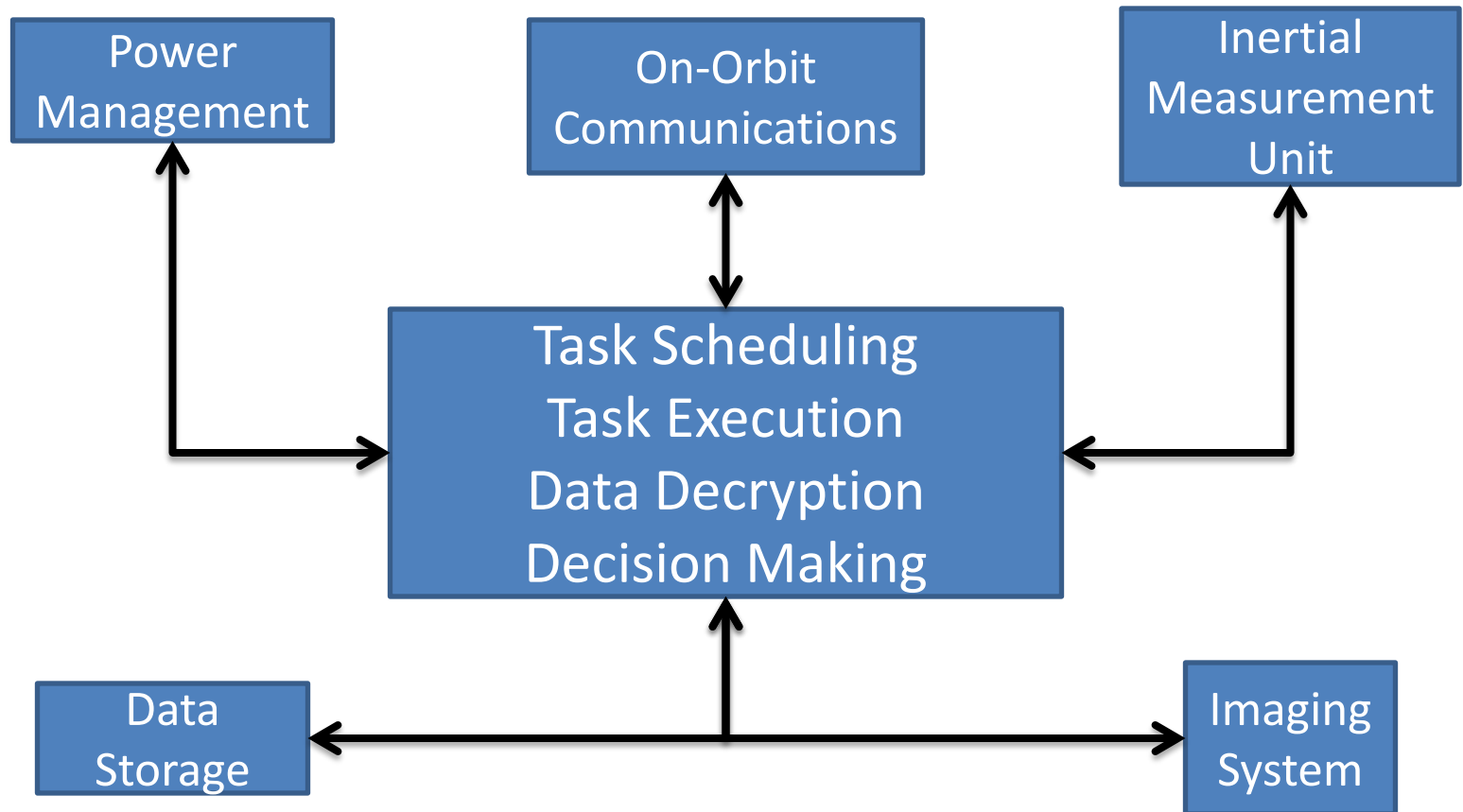


C&DH Devices

- ATxmega128A1U Microcontroller
 - Extensive hardware module support
 - 32 MHz max clock speed
- ADXL345 Accelerometer
 - 4 mG sensitivity
- L3G4200D Gyroscope
 - 8.75 mdps sensitivity
- MicroMag3 Magnetometer
 - 0.015 μ T sensitivity
- AT45DB642D Data Flash
 - 64 Mb capacity
 - SPI compatible
- MLX90614 IR Sensor
 - 0.5 $^{\circ}$ C sensitivity



ChargerSat-1 C&DH Subsystem Breakdown



C&DH Subsystem Requirements

- Task Scheduling:
 - Capable of receiving tasks from the ground, sorting by time
- Task Execution:
 - Capable of interrupting program flow to execute a task, then returning after scheduling next task.
- Data Decryption:
 - Capable of decrypting AES-128 data received from the ground
- Decision Making:
 - Capable of making deployment/operational decisions based on given data from IMU and other subsystems



C&DH Subsystem Requirements

- Inertial Measurement Unit:
 - Capable of measuring 3-axis acceleration, rate of rotation, and magnetic field, and returning the data to other subsystems
- Data Storage:
 - Capable of storing mission-critical data in a filing system for easy retrieval, as well as large (MB) files for non-critical mission objectives (taking a picture)

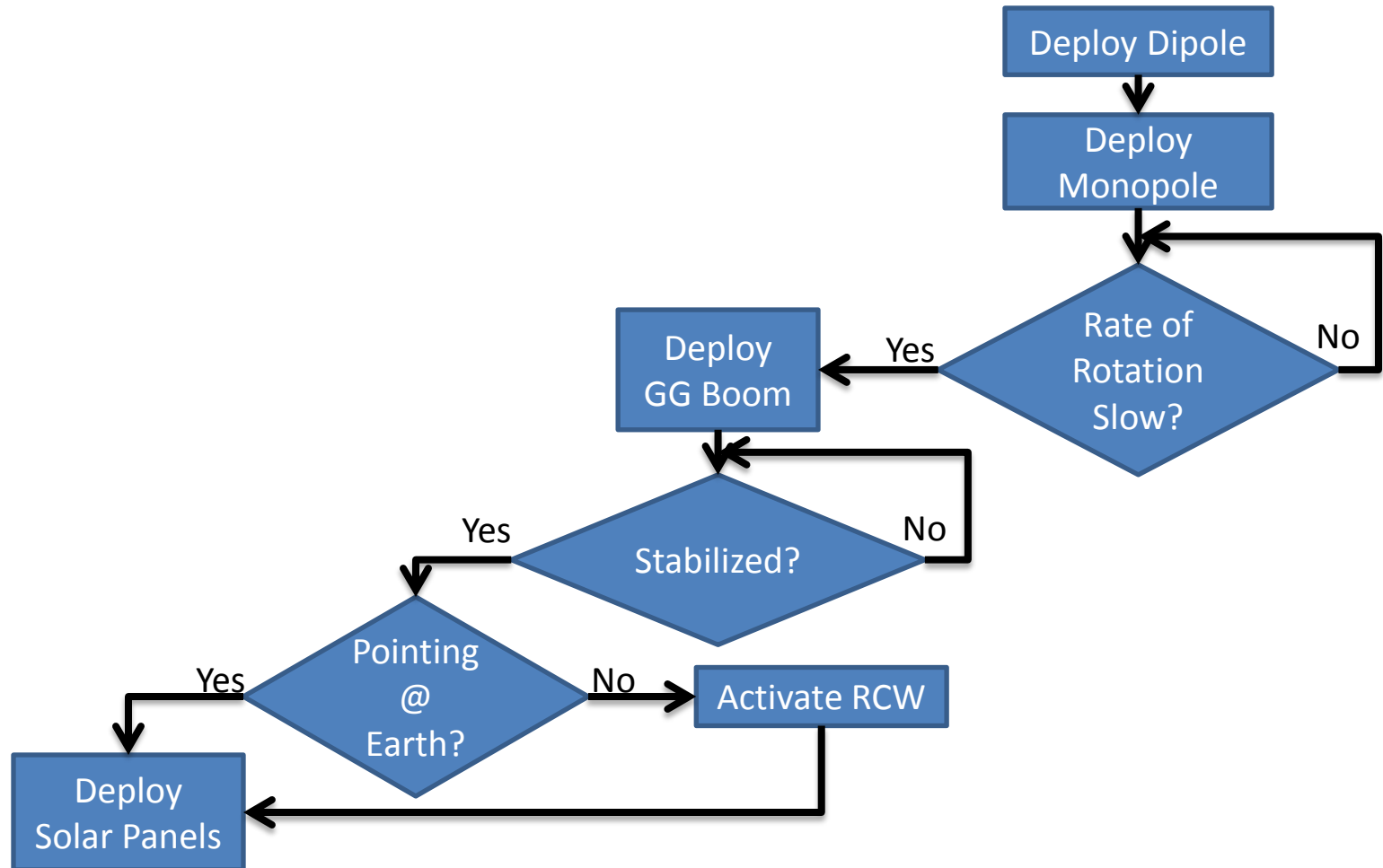


C&DH Subsystem Requirements

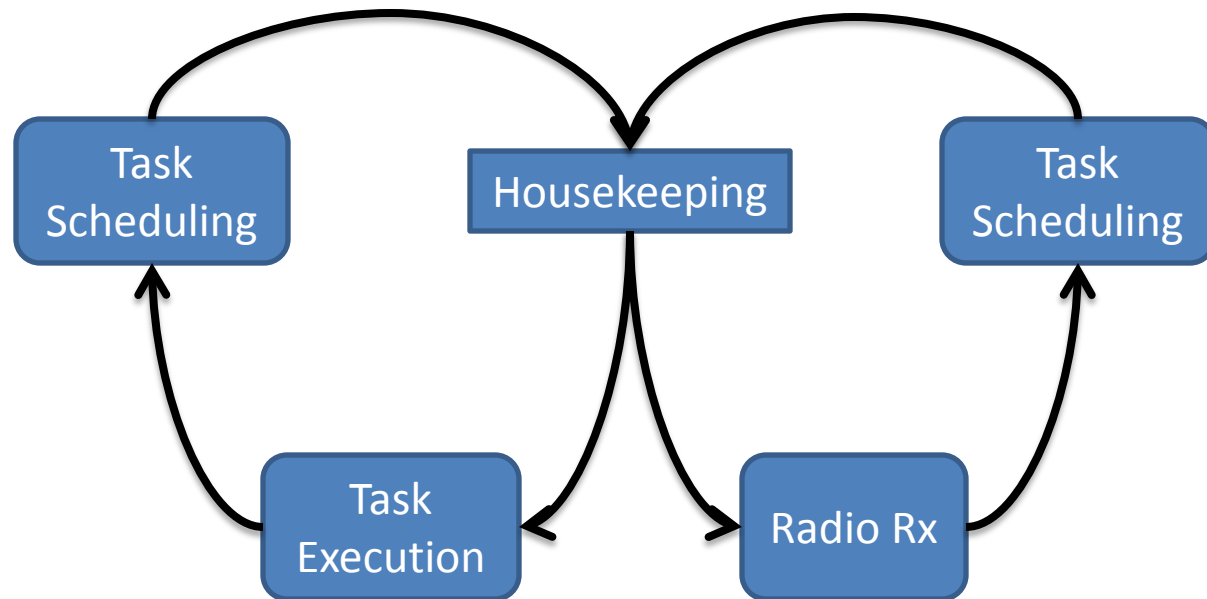
- Power Management:
 - Capable of monitoring power status on the bus, as well as enabling/disabling power to certain sections of the satellite
- On-Orbit Communications:
 - Capable of sending/receiving data to/from the ground station, as well as sending a beacon using alternating radios (dipole, monopole)
- Imaging System:
 - Capable of taking a picture from either the side or boom-mounted camera and returning the data to other subsystems



C&DH Deployment Algorithm

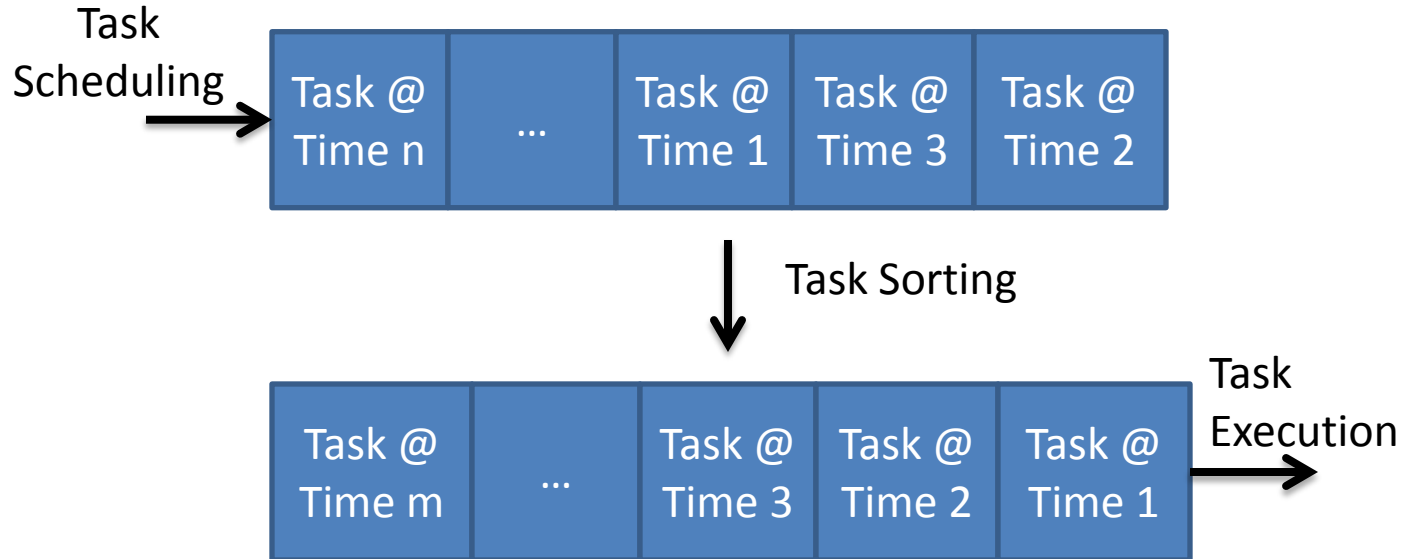


C&DH Operational Flowchart



C&DH Task Scheduling/Sorting & Execution

Basic Queue Format



Current Subsystem Software Technology Readiness Levels

- Task Execution: TRL 8
- Inertial Measurement Unit: TRL 8
- Task Scheduling: TRL 8
- Data Storage: TRL 8
- Data Decryption: TRL 8
- On-Orbit Communications: TRL 8
- Decision Making: TRL 8
- Imaging System: TRL 8

