Interface Between Cosmos And STK® /MATLAB® Simulation Platform

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Cosmos is an open-source software developed by Ball Aerospace
Overview

• Harris’ SmallSat Enterprise:
  • High-performance payloads and lightweight electronics
  • Affordable access to satellite information
  • Collaboration with Virginia Tech to expand on smallsat infrastructure and communication

• SmallSat modeling platform:
  • High fidelity
  • Tailorable framework to a spacecraft bus
  • Ground station command/telemetry processing
  • Constellation development

• Software integration:
  • Robust interface of tools for modeling/simulation
  • Cosmos, STK®, and MATLAB®
  • Generic bus and payload systems support
  • Coverage optimization
Ball Aerospace’s Cosmos:

- Open Source Satellite Command and Control Software
  - *COSMOS is a command and control system providing commanding, scripting, and data visualization capabilities for embedded systems and systems of systems. COSMOS is intended for use during all phases of testing (board, box, integrated system) and during operations.*
  - Written in the Ruby language
  - Several case studies and use examples available for public view
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Current Progress

- Finished building the system model:
  - Spacecraft subsystem definitions
  - SysML models
- Finished activity/sequence diagram interactions:
  - Bus structure interactions
  - Communication model interactions
- Started work on simulation tool
  - Several MATLAB® functions collected
  - MATLAB® - STK® interface working
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**Future Work**

- Finish initial simulation capabilities
- Investigate interface between Cosmos and MATLAB®

Software Integration Model

- COSMOS Command and Control
- STK Engine
- MATLAB

Input

Feedback
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Proposed progression of simulation capabilities:

Orbiting Spacecraft Model (MATLAB/STK) -> Ground Station/Communication (MATLAB/COSMOS) -> Command/Telemetry Capability (COSMOS)

Payload Modeling (MATLAB) -> Thermal Modeling (MATLAB) -> Complete ADCS (MATLAB)

Electrical Subsystem (MATLAB) -> Propulsion Modeling (MATLAB/STK)
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Questions?

Virginia Tech
Invent the Future