# NASA SBIR/STTR Technologies

## S4.05-8552

## Modular Autonomous C&DH Software with Built-In Simulation/Test


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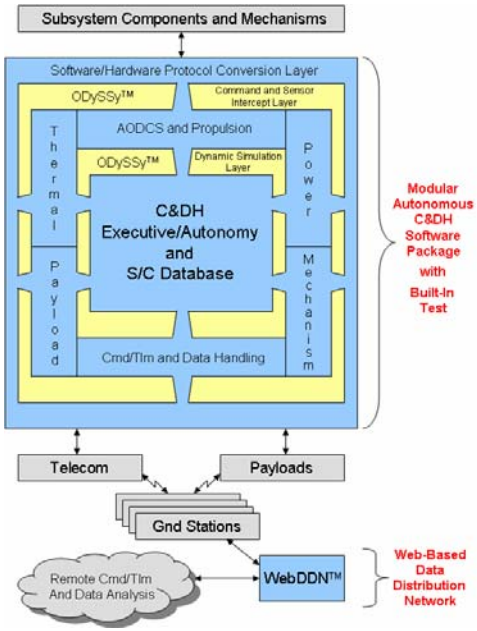


### Identification and Significance of Innovation

NASA, the Department of Defense (DoD), and Commercial spacecraft programs have the desire to minimize program costs while continuing to ensure mission robustness and flexibility. The spacecraft system that is a cost driver throughout the program life cycle is the Command and Data Handling System (C&DH), along with the associated algorithms and software. Advanced Solutions Inc (ASI) plans to develop C&DH software which can be targeted and adapted to a wide variety of C&DH hardware architectures and mission requirements. We also recognize the need to streamline the entire spacecraft development lifecycle and provide a product that not only provides highly autonomous core flight software that is adaptable to any mission, but also has the ability to replace traditional development, integration and test elements. This will be accomplished by expanding upon our revolutionary On-board Dynamic Simulation System (ODySSy) to allow the C&DH system to support all phases of the spacecraft lifecycle. Additionally, the test team, mission control team, and data analyst's can be in remote locations through use of the Web-Based Data Distribution Network (WebDDN).

Expected TRL Range at the end of Contract (1-9): 3 to 4

### Technical Objectives and Work Plan

The technical objectives of this Phase I program are geared towards proving the viability of the Modular Autonomous C&DH Software with Built-In Simulation/Test and include:
(1) Requirements development based on a current satellite market analysis;
(2) System definition focusing on increased autonomy, fault tolerance and data handling;
(3) Prototype development of key aspects of the technology;
(4) Concept testing on the Integrated Power and Data Ring (IPDR) avionics;
(5) Quantify cost reduction throughout spacecraft lifecycle using the built-in test capability.

The work plan for the project parallels the technical objectives noted above. Existing ASI products will be used as starting point for the system including flight software, AODCS algorithms and ODySSy. We will use our existing development tools to aid in the development of the prototype including our simulation tools which will aid in validating the technology.

### NASA and Non-NASA Applications

The proposed technology has broad NASA spacecraft application due to the systems modularity, autonomy and fault tolerance. It also has significant application to DoD spacecraft due to the Operationally Responsive Space (ORS) goals which are made possible through significant reduction in the integration and test timelines. The commercial spacecraft market is a key due to the desire to reduce cost, risk and time to orbit. This is especially critical for telecom constellations where savings are multiplied due to the number of satellites involved.

### Firm Contacts


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**NON-PROPRIETARY DATA**