Multidisciplinary Tool for Systems Analysis of Planetary Entry, Descent, and Landing

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Systems analysis of a planetary entry (SAPE), descent, and landing (EDL) is a multidisciplinary activity in nature. SAPE improves the performance of the systems analysis team by automating and streamlining the process, and this improvement can reduce the errors that stem from manual data transfer among discipline experts.

SAPE is a multidisciplinary tool for systems analysis of planetary EDL for Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, and Titan. It performs EDL systems analysis for any planet, operates cross-platform (i.e., Windows, Mac, and Linux operating systems), uses existing software components and open-source software to avoid software licensing issues, performs low-fidelity systems analysis in one hour on a computer that is comparable to an average laptop, and keeps discipline experts in the analysis loop.

SAPE uses Python, a platform-independent, open-source language, for integration and for the user interface. Development has relied heavily on the object-oriented programming capabilities that are available in Python. Modules are provided to interface with commercial and government off-the-shelf software components (e.g., thermal protection systems and finite-element analysis). SAPE currently includes the following analysis modules: geometry, trajectory, aerodynamics, aerothermal, thermal protection system, and interface for structural sizing.

This work was done by Jamshid A. Samareh of Langley Research Center. Further information is contained in a TSP (see page 1). LAR-17821-1

Bundle Security Protocol for ION

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This software implements bundle authentication, conforming to the Delay-Tolerant Networking (DTN) Internet Draft on Bundle Security Protocol (BSP), for the Interplanetary Overlay Network (ION) implementation of DTN. This is the only implementation of BSP that is integrated with ION.

The bundle protocol is used in DTNs that overlay multiple networks, some of which may be challenged by limitations such as intermittent and possibly unpredictable loss of connectivity, long or variable delay, asymmetric data rates, and high error rates. The purpose of the bundle protocol is to support interoperability across such stressed networks. The bundle protocol is layered on top of a