Small Space Platform Enhanced Internet Protocol Stack Device

Broadata Communications, Inc.

Technical Abstract
Wireless communication of small, nano and micro satellites will play a vital role to NASA mission and marketability of the satellite. The use of an Internet-based protocol, especially TCP/IP, can provide seamless network command and control continuity between terrestrial and space-based platforms and environments, as well as between distributed ground and space stations. However, long propagation and/or large transmission errors can significantly degrade current TCP/IP performance. In addition, current TCP is too complex to fit in a small footprint, which is required in microsats and nanosats. To address this NASA/ARC need for wireless networking technologies for small launch vehicles, Broadata Communications, Inc. proposes to develop a Small Space Platform Internet Protocol Stack with Space-Enhanced TCP technology (or SSP IP & TCP in short) to dramatically increase TCP/IP performance (20 times improvements over standard TCP/IP was demonstrated in Phase I) and enable the use of TCP/IP for processor-footprint constrained spacecraft in NASA missions. The overall goal of this Phase II project is to further develop the SSP IP & TCP technology, and to produce a full-scale, highly-optimized, IP embeddable SSP IP & TCP prototype system for placement in NASA networks with micro- or nano-satellite platforms. Our Phase II work plan is designed to complete SSP IP & TCP development and to produce: (a) a miniature, nanosat integrateable, standalone embedded network system module that provides all SSP IP & TCP functionalities and can directly meet NASA needs and resource-constraint integration requirements, and (b) a full-scale SSP IP &TCP software package that supports multiple network communication interfaces and provides automated installation for Linux or Windows operation systems.

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NanoSat Launch Vehicle Technologies

Enabling Technology for Small Satellite Launch

Design_Net Engineering LLC

Technical Abstract
Access to space for Small Satellites is enabled by the use of excess launch capacity on existing launch vehicles. A range of sizes, form factors and masses of small sats need to be accommodated. An integration process that minimizes programmatic/technical risk to the primary, allows “late flow” integration and predictable cost/schedule for the secondary enables regular and cost-effective access. The integration process proceeds smoothly when the right adapter accommodates the secondary in a seamless way. Design_Net, with our commercialization partner SpaceAvailable Inc. has designed a family of adapters that meet these criteria and one has been selected by NASA to complete development for targeted NASA rideshare opportunities. We are also currently working with United Launch Alliance (ULA) for a broader class of rideshare accommodations, and development of interfaces that allow late access on Evolved Expendable Launch Vehicles (EELV)s. Design_Net will continue, via this SBIR Phase 2, to develop the selected adapter to a structurally tested engineering model. This adapter can accommodate everything from 6u and 12u carriers to full up “ORS class” (800lb) small satellites and is applicable to Minotaur IV, Falcon 9 and Taurus 2.

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