Identification and Significance of Innovation
Tyvak Nano-Satellite Systems LLC (Tyvak) has developed a platform-independent Nano-Launch Vehicle (NLV) avionics solution based on the latest commercial electronic products and protocols. The proposed NLV avionics suite incorporates the following innovations and key features:
1) Low-cost/low-power/low-mass advanced COTS components throughout the avionics system
2) Wireless network protocols for NLV internal data and command transmission
3) GPS metric tracking to reduce range costs
4) Multiple networked low-cost computational nodes to provide redundancy and improve system performance and flexibility.

Expected TRL Range at the end of Contract: 3

Technical Objectives and Work Plan
The main objective of this effort is design of a low-cost/low-power/low-mass avionics system with GPS metric tracking for a NLV to Critical Design Review (CDR) level and demonstrate breadboard functionality.

The following technical objectives have been completed:
1) NLV Compatibility Study
2) Understand and Define NLV Avionics Requirements
3) Develop avionics architecture
4) Trade study of wireless protocols, and their associated hardware availability
5) Trade study of available GPS modules, and antenna solutions
6) Trade study of available IMU modules
7) Develop flexible avionics architecture

NASA Applications
NASA has expressed interest in the development of small launch vehicles specifically designed to carry NanoSats as primary payloads. An example application is the NASA Launch Services Enabling eXploration and Technology (NEXT) contract; this contract was awarded to Generation Orbit Launch Services, Inc. with the GOLauncher 2 vehicle, which provides a Phase III for implementing the NLV avionics design and flight testing to achieve TRL 9.

Non-NASA Applications
The U.S. Government has two additional NanoSatellite Launch Vehicle Programs: U.S. Army SWORDS Program and the DARPA ALASA Program. The technology developed under this NASA SBIR, could have direct tangible benefits to these other programs. Additional non-government launch vehicle programs may be interested once the NLV avionics are flight-proven.

Firm Contacts
Austin Williams
Tyvak Nano-Satellite Systems LLC
15265 Alton Parkway, Suite 200
Irvine, CA 92618
(480) 227-1113