NASA SBIR 2012 Phase I Solicitation

S3.01 Command, Data Handling, and Electronics

Lead Center: GSFC

Participating Center(s): JPL, LaRC

NASA’s space-based observatories, fly-by spacecraft, orbiters, landers, and robotic and sample return missions require robust command and control capabilities. Advances in technologies relevant to command and data handling and instrument electronics are sought to support NASA’s goals and several missions and projects under development.

The subtopic goals are to:

- Develop high-performance processors, memory architectures, and reliable electronic systems.
- Develop tools and technologies that would enable rapid deployment of high-reliability, high-performance onboard processing applications and would interface to external sensors on flight hardware.

The subtopic objective is to elicit novel architectural concepts and component technologies that are realistic and operate effectively and credibly in environments consistent with the future NASA science missions.

However, it is also expected that some commercial non-radiation hardened, higher performance capabilities should also be leveraged to meet performance, fault tolerance and recovery, power management, or other unique requirements.

Successful proposal concepts should significantly advance the state-of-the-art. Proposals should clearly:

- State what the product is.
- Identify the needs it addresses.
- Identify the improvements over the current state-of-the-art.
- Outline the feasibility of the technical and programmatic approach.
• Present how it could be infused into a NASA program.

Furthermore, proposals should indicate an understanding of the intended operating environment, including temperature and radiation. It should be noted that environmental requirements will vary significantly from mission to mission. For example, some low Earth orbit missions have a total ionizing dose (TID) radiation requirement of less than 10 krad(Si), while some planetary missions can have requirements well in excess of 1 Mrad(Si). For descriptions of radiation effects in electronics, the proposer may visit:

(http://radhome.gsfc.nasa.gov/radhome/overview.htm).

If a Phase II proposal is awarded, the combined Phase I and Phase II developments should produce a prototype that can be characterized by NASA.

The technology priorities sought are listed below:

• Novel, ruggedized packaging/Interconnect for high-density packaging (enclosures, printed wiring boards) enabling miniaturization.
• Miniaturization of C&DH subsystem components that enable reduced power computing.
• Innovative approaches for single event effects mitigation technologies leveraging non-RHBD (Radiation Hardened By Design) devices for performance (speed, power, mass) that is capable of exceeding traditional RHBD devices and/or capabilities that are not yet available with RHBD devices. Area of interest for this year is to focus on processors.

Power Conversion and Distribution relevant to Command, Data Handling, and Electronics, will be covered in sub-topic S3.04 Power Electronics and Management, and Energy Storage.