



NASA SBIR 2009 Phase I Solicitation

S4.04 Low Cost, High Accuracy Timing Signals

Lead Center: ARC

Participating Center(s): GSFC

Radio science is an important element of many missions, including small spacecraft missions, to planetary bodies and asteroids where mass determination is derived from perturbations of the spacecraft trajectory by the body. Traditionally these missions have required the inclusion of an Ultra Stable Oscillator (USO) with timing signal accuracy on the order of 10^{-12} to 10^{-13} Allan Deviation. Unfortunately these devices are currently prohibitively expensive for low cost missions. Other devices such as precision clocks can provide accuracy on the order of 10^{-8} Allan Deviation. It is envisioned that recent improvements in timing signal devices from other industries or new developments can provide a significant reduction in cost while still providing the necessary accuracy in the timing signal.

Proposals are sought for highly accurate timing signals that address or consider the following performance parameters:

- Provide timing signals with an accuracy of 10^{-10} to 10^{-12} Allan deviation;
- Be capable of utilizing the Space Plug-and-Play Architecture (SPA) developed at AFRL (See <http://www.dukeworks.org>);
- Small enough to fit within a 3U form factor or integrated avionics chassis;
- Mass less than 1kg;
- Power draw less than 5W;
- Stable over standard internal spacecraft bus operating temperatures of -25°C to 40°C ;
- Radiation tolerant with Total Ionizing Dose (TID) of 10 - 400 kRad (Si) with an average goal of 100 kRad (Si);
- Capable of surviving space launch environments.

Although these are baseline goals, proposals that are able to achieve near comparable values will also be considered.

The proposer to this subtopic is advised that the products proposed may be included in a future small satellite flight opportunity.