



## Compact Low Power DPU for Plasma Instrument LINA on the Russian Luna-Glob Lander

Walter Schmidt, Pekka Riihelä, and Esa Kallio

Finnish Meteorological Institute, Earth Observation, Helsinki, Finland (walter.schmidt@fmi.fi, +358 29539 4658)

The Swedish Institute for Space Physics in Kiruna is building a Lunar Ions and Neutrals Analyzer (LINA) for the Russian Luna-Glob lander mission and its orbiter, to be launched around 2016 [1]. The Finnish Meteorological Institute is responsible for designing and building the central data processing units (DPU) for both instruments. The design details were optimized to serve as demonstrator also for a similar instrument on the Jupiter mission JUICE.

To accommodate the originally set short development time and to keep the design between orbiter and Lander as similar as possible, the DPU is built around two re-programmable flash-based FPGAs from Actel. One FPGA contains a public-domain 32-bit processor core identical for both Lander and orbiter. The other FPGA handles all interfaces to the spacecraft system and the detectors, somewhat different for both implementations. Monitoring of analog housekeeping data is implemented as an IP-core from Stellamar inside the interface FPGA, saving mass, volume and especially power while simplifying the radiation protection design. As especially on the Lander the data retention before transfer to the orbiter cannot be guaranteed under all conditions, the DPU includes a Flash-PROM containing several software versions and data storage capability.

With the memory management implemented inside the interface FPGA, one of the serial links can also be used as test port to verify the system, load the initial software into the Flash-PROM and to control the detector hardware directly without support by the processor and a ready developed operating system and software.

Implementation and performance details will be presented.

Reference:

[1] [http://www.russianspaceweb.com/luna\\_glob\\_lander.html](http://www.russianspaceweb.com/luna_glob_lander.html).