

## Single Board Computer Core

Lennart Andersson  
Beyond Gravity Sweden AB, Sweden  
TO: Kostas Marinis, TEC-EDD

### Abstract:

Beyond Gravity is the major independent European supplier of Satellite Management Units (SMU) and On-Board Computers (OBC) for launchers, satellite platforms, payload control and similar equipment based on advanced computer technology. In order to remain competitive and to be able to provide the European space community with a highly integrated computer core, the processor, telemetry, telecommand and reconfiguration functions needs to be integrated on a single board.

The main enabler for the SBCC is the next generation system-on-chip. In the third and final phase of the activity an ASIC of this chip, called CREOLE (derived from the current generation chips CROME combined with the COLE) has been designed, manufactured, and validated.

The CREOLE integrates all major functions that form the basis of the novel generation of Beyond Gravity computers. Functions include a LEON fault tolerant processor, I/O controllers, on-board time, telecommand decoder, telemetry encoder and reconfiguration controller needed to support many different applications. A Flash Mass Memory controller for an integrated Platform Mass Memory is also included in the CREOLE ASIC, based on VHDL design blocks from a concurrent study.

The development has been divided into three separate phases, where the end result after the now completed final phase comprises the CREOLE ASIC (Application Specific Integrated Circuit), a board design implementing interfaces and suited for a typical OBC design, and corresponding software drivers that will be used for the next generation of highly integrated DHS and OBCs, called OBC NG. These units are targeting missions such as Plato, Athena, etc, and for a selection of the missions the new design has already been selected and project specific implementations of the OBC NG core have been further developed.

The CREOLE ASIC has been validated using a new board design called CM (Core Module) developed as part of the activity and which includes all required interfaces and the memory types supported by the CREOLE and selected for the OBC NG design. The validation environment has been a redundant set-up with two CM, making up a complete functional OBC NG core unit called SBCC BB.