SMALL SATELLITE MISSIONS SYMPOSIUM (B4)
Space Systems and Architectures Featuring Cross-Platform Compatibility (7)

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FLEXIBLE BUILDING-BLOCK ARCHITECTURE FOR LEO MICROSATELLITE PLATFORMS

Abstract

Micro-satellite platforms become the nominal solution for many LEO missions, due to achievable low mass, size and power, i.e. mission cost and more launch opportunities as a secondary payload. The interested applications cover several fields: Earth Observation, Science, Telecommunication, Security and Navigation. The design of a Micro-platform customizable for several missions but with a common core is of great interest, since it would permit to make the main bus sub-systems (On Board Computer, Power management, Attitude Control and TM/TC Transceiver) already tested and qualified, with reduced recurrent cost and time to launch.

Carlo Gavazzi Space (CGS) is developing a new flexible micro-satellite platform with building-block approach distributed on two levels: the satellite itself and the equipments. Platform nominal lifetime is 5 years; rad-hard components can be used to extend mission lifetime.

The satellite architecture is mainly formed by: Service Module, core of the platform and common part of the satellite; Propulsion Module, if needed, with nominal cold-gas system for attitude and orbit control; Payload Bay, interfacing the Payloads electrically and for power/data management and download.

Units and equipments within the Service Module are also designed and produced in a modular way by CGS:

- OBDH and Power Supply units consist of single board boxes, to be integrated in number related to the interfaces required by the selected mission;
- the battery is designed as the sum of modules of cells strings, added till reach the required capacity;
- the main solar panel is body-mounted, but two others deployable panels can be added if Payload requires higher power supply;
- Reaction Wheels and Magnetic Torquerods for attitude control are produced in models with different level of performances but same mechanical and electrical interfaces;
- TM/TC communication is supported with an S-band link, while an X-band link is optional for Payload data Download.

The platform software is centralized in the OBDH computer board. The core has evolved in time into a multi-platform-compatible product, configurable to run on different hardware (DSP, Leon processors) and operating systems (VSPWorks, RTEMS).

This paper provide a brief description of the common platform, with reference to the current on-going and planned CGS missions: the Italian MIOsat (ASI program), a technological EO mission embarking three optical payloads, scheduled for launching in 2012; Multispectral and Panchromatic EO missions,

with resolution up to 1 m GSD, are compatible, as well as Scientific and Communication applications, like the space-based AIS system.