PLATiNO Project: high performance integrated Avionics for a multi-mission mini-platform

SITAEL and its partners (Thales Alenia Space, Leonardo, Space Engineering) are developing a small satellite-class platform in the frame of the ASI National Project *PLATiNO*.

The PLATiNO platform is a brand new all-electric small platform product in the mini-satellites class with total mass in the range of 150-200 kg (launch mass), designed to be compatible to a varied range of applications (multi-applicability). The platform design requirements and technological solutions are strictly linked to the multi-purpose high level requirement for this product, aimed to serve different mission scenarios.

The PLATiNO platform is ideal for EO multi-payload integrated constellations (i.e SAR-Optical), thanks to the flexible platform-payload I/F and the key features (electric propulsion for constellation deployment, mini-CMG for agile re-pointing, ISL for formation flying, high data rate active antenna for EO Data management).

Constellation design can enable hourly image refresh, with weekly global coverage.

The platform is also suitable for series production for Telecom mega-constellation, by implementing available H/W options (SADA, PLIU) and taking benefit of low recurrent costs.

In order to be fully multi-application, the platform presents a high level of reconfigurability and scalability, e.g. multiple solar array configurations (body mounted/deployable/steerable), structural modular approach, compatibility with optional equipments to be utilized on the basis of the mission requirements, multipurpose payload interface design.
Moreover, PLATiNO's high performances are guaranteed by some key mission enabling technologies, including a low power electric propulsion system based on SITAEL's HT100, and a state-of-the-art and integrated avionics subsystem with mini-CMGs.

The **Avionics Subsystem** has been designed to integrate the OBDH and the AOCS functions. The core of the avionics subsystem is the **IPAC (Integrated Processing, Data-handling and AOCS Controller)**, provided by Thales Alenia Space.The IPAC architecture is based on different scalable modules (RTU included) and is based on a multicore processor SPARC LEON4x4 (Gaisler) and the XTRATUM Hypervisor software. The AOCS is based on high pointing accuracy sensors, up to three star tracker optical head (IPAC software is able to provide the data-fusion of the three sensors) high torque capability actuators (Mini-Control Moment Gyro, provided by Thales Alenia Space), with the feature of a gyro-less architecture. The Telecom configuration foresees a PLIU to provide the power-digital I/F with the P/L and Reaction Wheels instead of the Mini-Control Moment Gyro.

The **IPAC** (developed by Thales Alenia Space Italia) integrates the on-board computer, GNSS RX (GPS and GALILEO costellations) and P/L data handling (mass memory up to 1 Tb) functions and it manages all the P/F (and S/C) operations, in terms of command and control.

The high level of integration allows to achieve high level performances while optimizing mass, power and volume in order to be compliant to the constraints of a small class satellite.

Moreover, the IPAC is a highly standardised system in terms of architecture, functions, services, communications and interfaces, thus allowing compatibility with a wide range of potential applications. It is in fact designed to be compliant to ECSS SpaceWire (SpW), ECSS SpW Router, ECSS SpW RMAP, Mil-1553B-Std, CANOpen standard (ECSS Tailoring) CCSDS and ECSS communication standards.