

# AOCS SpaceWire Test Bench Preparation

SpaceWire is a well-established communication network standard for Space systems, defined by a set of ECSS standards. Current implementations mostly concentrate on payload systems as SpaceWire is one of the few medium rate solutions available (from 2 to few hundred Mbps, to be compared to the ~1 Mbps needed by a spacecraft avionics).

The “AOCS SPW Test Bench Preparation” study aims at confronting the SpaceWire technology with the Attitude and Orbit Control Systems needs and architectures, in view of complementing a preliminary assessment performed by the SAVOIR<sup>1</sup>-SAIF<sup>2</sup> working group. In that respect it intends to support the AOCS engineers in understanding the implications of implementing SpaceWire at sensors, actuators and system level both in term of impacts and opportunities. Some functions within the AOCS may indeed benefit from implementing SpaceWire interfaces on board for communication performance reasons like e.g., for connecting a camera unit that will be used for relative navigation, or for integrating the instrument in the AOCS closed loop (like on Gaia for example).

The study combines an assessment of how SpaceWire technology may respond to the AOCS needs w.r.t. the on-board communication layer, with an experimentation of a SpaceWire-based AOCS, featuring representative AOCS functions and architecture as well as a representative SpaceWire-based communication layer. It addressed in particular a few basic questions:

- Does SpaceWire fit the requirements of an AOCS?
- Which opportunities at AOCS level are opened by the use of SpaceWire technology?
- Which SpaceWire development is required to support the AOCS roadmap?

The study has confronted the AOCS needs with the SpaceWire technology and roadmap, and selected a reference architecture for investigating more in depth and confirming some of the key points resulting from the analysis. The outcome is that SpaceWire technology could be used as communication backbone without requiring a modification, at functional level, of the AOCS controller or the sensors/actuators. However, the decision to use SpaceWire as main AOCS communication backbone would be a more complex one. Opportunities opened by this case have been investigated that could contribute to such decision.

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<sup>1</sup> SAVOIR: **S**pace **A**Vionics **O**pen **I**nterface **a**Rchitecture is an initiative to federate the space avionics community and to work together in order to improve the way that the European Space community builds avionics sub-systems.

<sup>2</sup> SAIF: SAVOIR working group focusing the sensor actuator electrical interface (including data and power).