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BISS CUBESAT FOR A BI-DIRECTIONAL INTERNET OF THINGS SATELLITE SERVICE: AN  
OVERVIEW OF THE DEVELOPMENT STATUS

**Abstract**

In the framework of the ALCOR program, recently started by the Italian Space Agency to support the development of micro- and nano-satellite missions and technologies, the BISS (BI-directional IoT Satellite Service) project aims to the in-orbit demonstration of a CubeSat for Internet of Things (IoT) telecommunications, to be the first element of a future constellation, enabling a competitive low cost and global coverage IoT service. The project is led by the prime contractor IMT, supported by the University of Bologna (CIRI-Aerospace), D-Orbit, Leaf Space and Fincons, who share expertise in the field of mission analysis and control, attitude determination and control, ground segment hardware and services, IoT network and application servers, thus providing all the know how to put in place a full end-to-end service. BISS space segment will operate in LEO between 500 and 600 km by employing a CubeSat of 6U, 2U of which allocated for a new developed IoT payload, and the remaining volume for the satellite platform, mainly based on IMT heritage. BISS will use state-of-the-art dual connectivity, with both terrestrial and satellite networks, and a novel bi-directional communication link between satellites and end user (EU) devices. The latter will allow to transmit satellite information to each EU device and thus provide them with the information for switching from idle to operative mode when satellite passages are foreseen. As a consequence, a significant power saving will be possible, allowing reduced dimensions and, in turn, an easy installation in remote zones for various applications including, among others, the environment monitoring, the monitoring of mining infrastructures, of oil and gas infrastructures, of agriculture and livestock. BISS has completed the phase B1 and is now ongoing the preliminary design, which includes breadboarding activities for the IoT payload antenna and IoT antenna deployment mechanism, targeting the Preliminary

Design Review (PDR) at the end of Q2 2023. In the final paper the BISS project development status will be provided by sharing main outcomes of the preliminary design, including breadboard testing lessons learned. The roadmap for future development will be also presented looking towards the detailed design, verification and launch phases.