

Aalto-2 – An Atmospheric Nanosatellite

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Aalto-2 is an atmospheric nanosatellite designed to be part of the QB50 international satellite network project. The satellite is being built under the coordination of the Department of Radio Science and Engineering of Aalto University School of Electrical Engineering and is funded by the Finnish Funding Agency for Technology and Innovation (TEKES). It is designed to be a two-unit (2U) CubeSat, and it will be mostly built in-house by students of the university.

QB50 will be a network of 50 CubeSats in a ‘string-of-pearls’ configuration, launched to a circular low Earth orbit at 320 km altitude [1]. The satellites will carry standardized sensors for multi-point, in-situ, long-duration measurements in the largely unexplored lower thermosphere and ionosphere. Due to atmospheric drag, the satellites will decay to lower orbits allowing exploration of lower altitudes. The constellation is planned to be launched in 2015 and the lifetime of individual satellites is estimated to be about three months.

The main goal of the Aalto-2 project is to advance space technology education and cooperation in Finland, and help carry out the QB50 scientific mission [2]. The Aalto-2 satellite will be fitted with the QB50 sensor kit and the design of the rest of the satellite is based on the heritage received from the Aalto-1 project. Additional payloads are also planned: A highly miniaturized radiation detector to continue the measurements started with Aalto-1 and a small lightning sensor to demonstrate lightning detection feasibility from small satellites. The preliminary subsystem configuration is presented in Fig.1.

Apart from the QB50 scientific experiment, a formation flight experiment is proposed with the Tartu University ESTELLE satellite [2]. This allows reference measurements for the QB50 scientific measurements as well as the cold gas propulsion experiment of the ESTELLE satellite. An inter-satellite link is planned to be established with VHF/UHF radios.

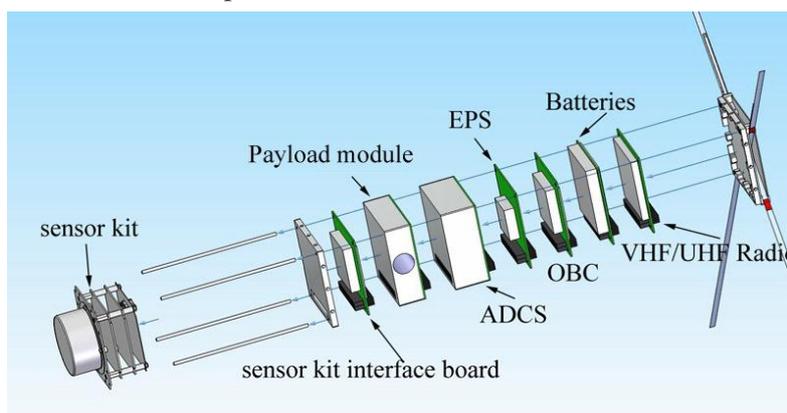


Figure 1: Overview of the Aalto-2 system (10*10*22.7 cm).

References

- [1] Von Karman Institute of Fluid Dynamics (VKI), *Call for CubeSat Proposals for QB50*. Available at: https://www.qb50.eu/call_proposals_QB50.pdf [Accessed 5. Sept. 2012]
- [2] A. Kestilä, T. Tikka, O. Khurshid, S. Lan, S.B. Cheikh, J. Praks, A. Näsilä, *Aalto-2 Standard QB50 Atmospheric CubeSat preliminary design*. [Unpublished]