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HEINRICH-HERTZ: A GERMAN DUAL PURPOSE MISSION ON A SMALLGEO PLATFORM

Abstract

The German satellite communications mission Heinrich Hertz is a dual purpose mission undertaken by the Space Administration of the German Aerospace Center (DLR) on behalf of the German Federal Ministry for Economic Affairs and Energy (BMWi) and participation of the German Federal Ministry of Defense (BMVg). Heinrich Hertz features a scientific/technical payload and a military payload which operate independently from each other. This paper presents the mission based upon the recently completed Preliminary Design Review. The scientific mission aims at developing system capability for communications payloads on small geostationary satellites and testing new technologies and techniques at payload, platform and ground level. The selected technologies are implemented within dedicated in-orbit verification (IOV) units which are part of the platform or the scientific Ka-band payload. The IOV units consist of flexible TWTAs, tunable input and output multiplexers, re-programmable on-board processors, a flexible downconverter, an ISL multi-beam antenna, a highly stable reflector antenna and a hybrid sensor bus. The scientific payload as a whole provides high flexibility in terms of interconnectivity, routing, power and frequency plan thus offering regenerative transponder capabilities. Specialized communication experiments have been defined for the individual validation of the IOV units and for end-to-end system level testing of novel SatCom architectures and applications e.g. multi-user transponder access, inter-satellite links, data relay, mobile broadband communications and disaster management. The feasibility of the communication experiments has been confirmed by system simulations and link budget calculations. The military mission aims at the provision of dedicated SatCom services in the Ku- and Ka-bands to landmobile, maritime and airborne platforms. The military payload incorporates several steerable theater beams for global coverage and a homeland beam over Germany. Both payloads are accommodated on the SmallGEO platform which was developed in frame of the ESA Artes 11 Development Programme under the industrial lead of OHB System AG. The Heinrich Hertz mission is the first joint undertaking by the two ministries in Germany, realized by the DLR Space administration as single customer to the industry. This approach ensures the consistency of the dual purpose requirements.