IAF EARTH OBSERVATION SYMPOSIUM (B1)
Earth Observation Sensors and Technology (3)

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LDRS – THE SCALABLE SOLUTION OF LARGE DEPLOYABLE REFLECTOR SUBSYSTEMS FOR EARTH OBSERVATION AND TELECOMMUNICATION

Abstract

The forecast for space-based antennas – especially in the Earth observation market with instrument types of microwave radiometers, radar and SAR – shows that one of the trends is towards larger reflector diameters exceeding the fairing envelope constraints of launcher vehicles. The solution for larger reflectors is provided by unfurlable reflectors in combination with deployable arms. In response to these needs, the family of Large European Antennas (LEA) was developed by the European consortium "WeLEA", providing a portfolio of Large Deployable Reflector Subsystems (LDRS) based on a scalable architecture adaptable to reflector diameters and arm length from 3 m up to 20 m, suitable for operating in a wide range of frequency bands from C- up to Ka-Band. This range will satisfy the market needs for a large portion of estimated space missions expected for the future. Current technology developments are analysing the mesh technology for even higher frequency bands up to V-Band.

Numerous technology development activities on various building blocks of Large Deployable Reflector Subsystems (LDRS) have been performed by European industry and WeLEA consortium partners in the

frame of EU, ESA, national, and own RD-projects since more than 20 years. Following the European Commission co-funded development activity (H2020) LEA, the corresponding deployable reflector and arm development activities were continued in two ESA-funded contracts. Both contracts in common is the objective to demonstrate the technological readiness of the complete LDRS Subsystem (deployable reflector and arm, with associated HDRMs, deployment control electronics and thermal hardware) for the EU Copernicus High Priority Candidate Mission CIMR (Copernicus Imaging Microwave Radiometer) which requires a rotating unfurlable mesh reflector in the 7 to 8 m aperture range operating up to Ka-band RF.

Analysis of the future market needs for deployable antenna reflectors show not only a steady, but even an increasing demand with tendency for larger reflector diameters for specific scientific missions, exceeding corresponding payload fairing constraints. Thereby the Earth Observation market segment is the main driver for the next 20 years. With the scalable design of the LDRS subsystem developed by the consortium partners, the technical solution is well positioned to foster this market with tailored configurations of a European sourced solution.

The presentation will elaborate on the developments and test campaigns of the European sourced Large Deployable Reflector Subsystems (LDRS) towards the TRL-6 readiness level and the perspectives of ongoing contracts and future Earth observation and telecommunication applications.