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A SMALL DEPLOYABLE CASSEGRAIN REFLECTOR ANTENNA FOR SMALLSAT APPLICATIONS

Abstract

Enabled by technology miniaturisation, the satellite constellations market brings a growing challenge of link capacity for the smallsat operators. One of their key challenges is to reduce ground segment complexity enabling near real-time services while accommodating systems on smaller platforms to reduce launch costs. One part of the solution could be a compact high-speed Ka-band antenna capable of connecting a LEO smallsat to a MEO or GEO asset. The small deployable cassegrain antenna described in this paper is suitable for smallsat applications focusing on data relay and communications. The novel Oxford Space Systems 'Hinged Rib' antenna architecture is based on an umbrella type of folding structure. The development was co-funded by the European Space Agency and consists of a main reflector, sub-reflector, deployment mechanism and RF feed structure. The whole system has a stowed volume of around 2U (215x100x100 mm) and a deployed main reflector diameter of 600mm. This antenna operates in two bands at K and Ka, with a transmit band covering 27.7 – 30 GHz and a receive band of 17.7 – 20.2 GHz. First test results have demonstrated high gain performance, with 39 dBi achieved in the transmit band and 35 dBi achieved in the received band. The Hinged Rib antenna makes use of gold-plated tungsten metal mesh material for the primary reflector. The mesh is designed by Oxford Space Systems and manufactured in house in a new facility commissioned in 2021. An Engineering Model of the antenna is currently undergoing testing with the aim of being ready for a technology demonstration mission in the next 12 to 18 months.