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AFTER ROSETTA & MYRIADE, NOW A NEW GENERATION OF RADIO EQUIPMENT FOR MERLIN & MYRIADE EVOLUTION

Abstract

The ESA Rosetta mission was decided in 1993 with an ambitious scientific objective and severe constraints on the platform in terms of reliability, cost, occupation and consumption. CNES responsible for the proximity link between Rosetta and the lander Philae, encouraged a size and mass reduction policy regarding the radiofrequency satellite equipment. CNES and Syrlinks jointly worked to develop miniature and low cost single unit S-band transceivers, with low energy consumption, based on components off the shelf (COTS). An effort has been engaged to improve equipment reliability as the cruise was predicted to last 10 years.

The acquired expertise helped to develop in synergy, TTC S-band equipment of the Myriade satellites series, using a generic platform for micro-satellite (150-200 kg). Today, more than 20 micro-satellites are in Low Earth Orbit (LEO), using radiofrequency link inherited from Rosetta. This technology has also been used by NASA for the proximity link of the Deep-Impact mission, between the impactor and the orbiter which explored the comet Tempel (2005). Experience returns of such missions will be presented. All S-band equipment worked nominally in orbit, actually for lifetimes significantly higher than the 5 years initially targeted. More than 15 years later, the LEO micro/mini satellites market has undergone a revolution, thirsty for discovery and longer operational missions. The radiofrequency equipment need to be adapted, especially an increasing reliability, higher telemetry, and advanced TTC (coherence, ranging ...). A strategic choice has been made on Class 3 ECSS-Q-ST-60C recommendation use. This means that each component are qualified and lifetime is increased and guaranteed for duration in orbit up to 7-10 years. CNES is involved in the development of a new platform, called Myriade Evolution (2nd Generation), inheriting from both experience of Rosetta and Myriade first generation, and addressing the increasing needs for extended payload. The Myriade Evolution spacecraft series can handle a mass about 400 kg, and a 150W payload power . This paper presents the transition between two generations of RF equipment -(Myriade Evolution program) and introduces the new developed features, like higher transmitted power and high data rate telemetry, and flexibility in terms of modulation and coding.

In a second part, an application case is presented with the DLR – CNES Merlin mission, with a focus on the radio solution. MERLIN (Methane Remote Sensing Lidar Mission) will be the first satellite based on Myriade Evolution platform, will measure the greenhouse gas methane variations in the atmosphere.