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Author: Mr. Julian Fernandez Barcellona
FOSSA Systems, Spain

Mr. Vicente González
FOSSA Systems, Spain
Mr. Sergio Cuevas del Valle
FOSSA Systems, Spain

FOSSASAT-2E CONSTELLATION: UNLEASHING SPACE-BASED SATIOT FOR INDUSTRIAL APPLICATIONS THROUGH PICOSATELLITES

Abstract

Over 80% of the Earth's surface currently does not have reliable and robust access to connectivity. The exponential growth of Internet of Things technologies has led to an increasing demand for more general connectivity concepts, for which no actual infrastructure nor plausible, current solutions exist. To that end, Space missions present an excellent opportunity for providing communications in remote areas, but the cost of traditional Space Industry concepts has limited the barrier to entry of such technologies, stemming from the need of associated expensive space infrastructure and bulky terminals.

In 2019, FOSSASat-1's mission aimed to provide a low-cost international IoT network using Long Range (LoRa) spread spectrum modulation technology. This inexpensive telecommunications technology vastly increases link budgets while reducing the necessary power and reception systems on the spacecraft, thus allowing massive deployment of inexpensive picosatellites in a distributed manner. The mission showed the advantages of using picosatellites in distributed satellite systems, that could be interconnected through long-range radio links to expand global coverage, at minimum development and service cost.

The success of FOSSASat-1's mission was the reason of birth of FOSSA Systems as a global connectivity provider, developing a low-cost network for low-power IoT communication. FOSSA focuses on the integral development of picosatellites buses (spacecraft weighting less than 1 kg), which integrate lower cost and cutting-edge space technology (such as miniaturized EPS, ADCS or COMMS systems), to connect and monitor assests all over the globe surface.

In January 2022, FOSSA successfully launched its first six FOSSASat-2 Evolved units, part of its main 80-satellite constellation. In this work, central insights about FOSSASat-2 Evolved platform design, development and manufacturing processes will be presented and analysed. In addition, preliminary missions results together with FOSSA's self-developed infrastructure for constellation deployment and operations will be shown. Finally, extracted conclusions and leasons learned from a 2 years experience designing, developing and operating miniaturized spacecraft will be presented.