29th IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)
Interactive Presentations - 29th IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (IP)

Author: Mr. Lubomir Toshev
EnduroSat AD, Bulgaria

Mr. Yuri Matheus Dias Pereira
EnduroSat AD, Bulgaria

A TOOLSET FOR DEVELOPMENT, CONFIGURATION, AND OPERATION OF SOFTWARE-DEFINED SATELLITE PLATFORMS

Abstract

A private and competitive launch market, combined with the growing capabilities of nanosatellite systems, have made access to space more affordable than ever. However, the engineering challenge of sending a payload into orbit and operating it remains as complex as always. The concept of software-defined satellites aims to abstract this challenge and make space accessible to a wider audience than traditional space players. This is achieved by providing satellite platforms that share the same basic hardware but can have their software configured for custom mission profiles. In this paper we describe a toolset that dramatically simplifies the development of on-board software, configuration, testing and mission operations of software-defined satellites. We demonstrate how the toolset enables these capabilities for a given mission by only requiring an abstract mission database definition describing the satellite's functionality. The toolset consists of three parts. The first is a desktop application that serves as an integrated environment for ground-based configuration and integration testing. The desktop tool provides visual dashboards and the mechanism needed to communicate with the platform and its subsystems on the ground. The second tool is a cloud-based mission control and operations software. It enables visualizations and capabilities similar to the desktop application but tailored towards remote communications. The cloud application is accessible from everywhere on the internet. The final tool is a software code generator. By providing a mission database definition describing a custom mission's desired capabilities, the code generation tool automatically creates all software code needed for the satellite's on-board segment, the ground-based testing application, and the operations software. The toolset described above has been validated on EnduroSat's software-defined satellite platform during the lifecycle of numerous real missions – from initial integration to operations. These missions demonstrate that the toolset greatly simplifies how a mission specific satellite platform can be integrated, tested, and operated.