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MA61C SMART ADAPTER ON-BOARD COMPUTER

Abstract

The current satellite market is more accessible than before. In these market conditions, one can see that traditional and fairly slow contract negotiations are decreasing. With the increase in launch options (including shared launch opportunities), manufacturers aim to produce satellites as fast as possible. Thus, the space industry is developing modular and generic satellite platform designs that rely on different equipment and systems, especially with the increasing interest in developing smaller satellites. As a result, satellite developers are turning to different subsystem or equipment providers for shorter lead time and lower cost, but increasing the complexity to make these different subsystems/equipment compatible with each other. To mitigate this problem faced by both large-scale commercial satellite developers and Smallsat manufacturer, Space Products and Innovation GmbH (SpiN) provides a flexible and modular solution. Its Command and Data Handling system runs on the Multipurpose Adapter Generic Interface Connector (MA61C) on-board computer (OBC). This is an innovative system that seamlessly connects different subsystems to the onboard software (which can be hosted externally or internally) without driver installation or user configuration. The modularity solution focuses on connection of MA61C OBC to a sub-system without depending on a physical location or the interface communication type. The core of MA61C is the GR712RC LEON3-FT SPARC V8 processor which supports multiple interfaces that can be used as both inputs and outputs. The MA61C holds a database of drivers, enabling plug-and-play functionalities such as device recognition, self-configuration, and driver installation. This helps in integrating the subsystems without additional programming. It is additionally equipped with an internal memory for storage of onboard software, drivers, and data. This design increases the compatibility with different suppliers and widens the opportunities and enables re-use of 'off-the-shelf' components and subsystems. In IAC 2021, the MA61C OBC is briefly mentioned while describing the SPiN-1 mission. This paper shall explain the design, development, testing, and functionality of the modular MA61C OBC system in detail. Along with this, the plug-and-play concept involving embedded driver database (EDS), routing, and converting of protocols will be described along with examples from previous projects. The goal is to foster a generic platform with flexible design and easier integration solutions for the industry, widening the scope for all current and new suppliers, thus creating a marketplace for quick satellite design solutions using MA61C Smart Adapter OBC.