Paper ID: 32894
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SPACE SYSTEMS SYMPOSIUM (D1)
Space Systems Architectures (4)

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MODULARITY AND OPERABILITY CONCEPTS OF RTU'S IN MODERN SATELLITE AVIONICS

Abstract

In today's large satellites, either for telecom, navigation or science/Earth observation, the very high number of electronic subsystems, which need to be managed, lead to ever increasing numbers of interconnections. The mass, the complexity and the requirements in terms of testability of these interconnections, the so-called harness, ask for new concepts for the satellite avionics architecture in the future.

Traditionally, satellite avionics are organised in a centralised way, with a central satellite and/or payload management unit (SMU/PMU) connected in a star layout network to all functionally slaved electronics subsystems. In modern avionics however, a decentralised architecture is preferred, where part of the functionality is shifted from the central SMU/PMU to local nodes which are much closer to those electronics subsystems which they manage. Such local nodes are called (micro-)RTUs. The slightly increased total mass of the smaller SMU/PMU plus the local nodes as compared to one "big" old SMU/PMU pays out, when the significantly reduced harness mass of the modern decentralised architecture is included in the mass balance sheet. First decentralised designs show a potential reduction of the combined SMU/harness mass by 50

Other benefits of the decentralised avionics architecture are: the assembly/integration/test (AIT) effort is reduced significantly, since parallel work is possible (say each of the six panels of a typical satellite are integrated and tested in parallel, before the panels are mated together and final integration testing is performed), more flexibility and better redundancy concepts can be realized, and higher modularity of each local RTU tailored to the local needs is achievable, which in turn allows better procurement prices.

We will present the current satellite avionics design concepts of our OHB in-house satellites and the tailored RTU concepts we include. Our RTU development roadmap will be shown as well as first detailed designs and test results.