IAF SPACE OPERATIONS SYMPOSIUM (B6)
Ground Operations - Systems and Solutions (1)

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ERMES A MULTIMISSION AND ADAPTATIVE MCS SW SUITE

Abstract

Space scenario has been changing over the years, showing a huge increase of small missions and constellations composed of tens/hundreds of micro/pico-satellites. This NewSpace advancement just produced a new generation of satellite operators, interested in monitoring and controlling several platforms with a "smart" HW/SW infrastructure. This approach is opposed to the classic one focusing only on specific requirements case by case and vertical customizations. The need for tools supporting NewSpace mission operators is shared and justifies a market for commercial solutions. ERMES aims to support NewSpace operators providing a multi-mission and adaptative Mission Control System SW. It was born from Planetek's practical experience in the ground segments: starting on ground support equipment and scientific mission, it is able to provide a set of tools (along with a full development framework) intended for satellite integrators and operators. ERMES has been designed to preserve compatibility with traditional ground segments (TMTC Space Packet Protocol, CCSDS services, SCOS2K MIB interface, parameter monitoring, TC stack execution, displays), but implementing a lightweight approach integrating reliability with scalability and adopting a state-of-art technological stack. The system can be deployed in a cloud-based environment and its graphical user interfaces are available on a native cross-platform SW client and via the Web. ERMES can manage several missions just by adding control "models" (like lightweight executable plugins) to the main distributed architecture, also with different MIB interfaces, without the necessity of changes in the SW implementations. Procedures layer is provided as a Python scripting environment fully integrating SPELL (Satellite Procedure Execution Language and Library) framework and allowing development and execution of satellite automated procedures shareable across Satellite Operators and Satellite Manufacturers. One of the main scores of ERMES is the full configurability of the Secure Data Handling System (SDHS) interfacing with the Ground Stations providers. In particular, operators are allowed to select the target Ground Station to communicate with, the data format to be processed (Space Packets, Frames, CLTU/CADU) and the communication protocol (SLE, AWS, etc). This provides ERMES with huge flexibility in terms of TMTC data exchanging. ERMES can also provide functions for the planning of routine and special satellite operations. ERMES is adopted for the Solar Wind Analyser instruments suite (onboard Solar Orbiter) monitoring, in STRIVING IOD/IOV and uHETSat missions ground segment and will be also part of the ground segment of PLATiNO 1 and PLATiNO 2 missions from the Italian Space Agency like MCS and Spacecraft Planner.