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HIGH RATE DATA BROKER FOR FSL OPERATIONS

Abstract

In 2018 the European Space Agency will overhaul the Columbus Fluid Science Laboratory (FSL) on board the International Space Station in order to operate the experiment containers Soft Matter Dynamics (SMD) and Reference mUltiscale Boiling Investigation (RUBI). The upgrade of the FSL Video Management Unit for the acquisition of the high-rate data images or science data produced during the scientific runs, introduced the need of an upgrade of the FSL ground segment to cope with the operation concept requirements. A near-real time integrated visualization and interpretation of FSL high-rate data and telemetry simultaneously are difficult since the FSL high-rate data stream and the FSL telemetry follow different paths. To address this problem, a tool has been designed and developed to ingest and archive the FSL high-rate data stream, to create Processed Parameters outlining the high-rate data stream content, to support the operational display of high-rate data snapshot, and to disseminate the data to the science teams. The Processed Parameters have been defined in such a way that they can be handled by the tools and displays originally developed for the medium- and low-rate telemetry.

After a brief summary of the high-rate data stream produced by the FSL experiment containers SMD and RUBI, this paper will present the architecture of the new data broker tool which allows the coupling of high-rate data with medium-rate telemetry, the resulting ground segment modifications, and how the design is taking advantage of the different working modes of the FSL Video Management Unit. The paper will also discuss the lessons learned and challenges encountered during the tool development and validation phases: the ground segment network performance, the wider range of data formats and the data distribution to the science teams.