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IMPLEMENTATION OF AN ADDITIONAL COMMAND SYSTEM, PATHING THE WAY FOR NEW TASKS AT COL-CC

Abstract

Thomas Pesquet's "Proxima" mission signifies another high activity period at the Columbus Control Center (Col CC), which continues with Paolo Nespoli's launch to the ISS in mid-2017. Besides numerous experiments, such as Sarcolab, Airway Monitoring and Everywear, Thomas also performs important maintenance activities, including a CWSA exchange in the Thermal Control System and the Cycle 14.1 software upgrade for the Data Management System. At Col-CC, preparation for these and other activities has long been started. Our first step was to prepare for the on-board Cycle14.1 software upgrade. In parallel, it was necessary to upgrade our monitoring and command infrastructure due to the planned integration of new racks inside and outside of the Columbus module, as well as a new external payload. Some of these new subsystems and payloads require a completely new command interface, called MPCC. MPCC stands for Multi-Purpose Computer and Communication, and introduces secure end-to-end communications to Columbus, permitting scientists to directly access payloads from their home base via the Internet. Phase 1.1 of this project began in 2015 and included several demonstrative tests performed by ESA astronaut Andreas Mogensen. Phase 1.2 is currently running and allows several payload users to access and control their experiments via a Ku-band link and the station-wide LAN. Whereas Phase 1 mostly uses existing on-board equipment, Phase 2 - starting towards the end of 2017 - will introduce new hardware to the ISS. This will include a new-generation laptop and a new, commercial off-the-shelf LAN switching box deployed in Columbus. In addition, a Ka-band antenna will be attached to the outside of the Columbus module during an Extra-Vehicular Activity in 2018. This will allow data transmission via the new generation of European data relay satellites using the Ka-band frequency. The paper describes our preparational work as well as Col-CC responsibilities during nominal operations, in particular the coordination and control of nominal IP traffic over the Columbus LAN, and monitoring intra- and extravehicular equipment.