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MPCC AND KU-IPS, NEW WAYS TO CONTROL THE NEXT GENERATION OF COLUMBUS PAYLOADS - GROUND SEGMENT ASPECTS

Abstract

The ISS (and the Columbus module as integral part of it) was originally designed to use the classical space to ground communications approach. This "legacy" system consists of CCSDS based telecommand (TC) and telemetry (TM) packets routed via a complex chain of a hierarchical TC/TM server architecture.

The implementation of the European Multi-Purpose Communications Computer (MPCC) using the NASA KU-IPS (Internet Protocol Service) allows much easier and straight forward IP-based communications. An end-to-end IP-based link from the ground user to the Columbus payload LAN, including via wireless access points on-board, allows a new category of simpler, more commercial, payloads, and opens the research capabilities to an entirely new group of payload users.

While a corresponding paper (Implementation of an Additional Command System,Pathing the Way for New Tasks at Col-CC) describes the changes to the on-board systems and operations for ESA's Columbus module, this paper discusses the required additions in the ESA ground system architecture, the changes in the paradigm in ground operations, and examines potential chances and problems associated with both.

The MPCC/KU-IPS is an additional path to the legacy system and requires the development of alternative operational procedures and handling parallel to the established operational processes. The main idea behind the implementation of KU-IPS and MPCC was to allow new users a simplified and direct access to their payloads on board Columbus.

The direct IP- communications path and, even more the direct Internet access of User Home Bases (UHB)/Investigators, define additional tasks and responsibilities for ground positions. As the UHB may no longer be "hidden" behind the established User Center (USOC), the ground controller is required to act more in direct payload, and payload user, support. The additional support will also be required as the ground controller now faces a larger community who are not as highly trained in operations procedures as the current personnel at the USOCs. The final phase 2 of ESA's MPCC/KU-IPS implementation is the planned integration of an own Ka-Band terminal on Columbus. This builds a completely new direct communication path with –again- even more tasks and responsibilities for the ground controllers.