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COLUMBUS ARCHITECTURAL CONSIDERATIONS FOR ON-ORBIT NETWORK SERVICES

Abstract

Columbus currently provides two major Networks; on the one hand it is the Columbus Data Management System and on the other the commercial inspired IP communication across Multi-Purpose Computer and Communication (MPCC) path via Joint Station LAN (JSL). MPCC allows various new Network solutions and -services, several approaches in parallel to JSL, some are individual for Columbus.

Since 2016 MPCC works for a variety of Small Payloads and has already supported Class-1 Payload Services (Fluid science Lab with GEOFLOW 2/C). The central Server for all MPCC Services inside Columbus is the European IP Communication Laptop (EICL). It is a HP Z-Book and has several advantages for the concern of accessibility and crew maintenance; in contrast the accommodation of EICL and its stability are issues. The stability problems of commercial Laptop Hardware are likely to occur and potentially worsen during operational lifetime. Another disadvantage of EICL is the accommodation of the Unit in Columbus center aisle, with special attention to commercial connectors, potentially affected by inadvertent crew induced loads. A Server is proposed as solution for further strengthening of Columbus MPCC stability and broader Services to Payloads, Experiments, Astronauts and the Ground Operators. The proposed MPCC Server (MPCCS) solution does not follow commercial stack configuration for accommodation reasons and power- plus cooling budget reasons; it does not require ISPR Volumes and therefore does not waste valuable Volumes for Experiments. This Project combines the physical accommodation, access to all required resources and budgets plus access typology of Payload- and Sub-System customers. Accommodation will be outside ISPR Racks and Centre aisle, thus outside workspace of Astronauts. MPCCS does not require forced air cooling and is therefore no emission source of warm air to Columbus Cabin Air. Power management allows efficient balance under high demands such as computing service provision to Payloads or within phases where Power availability is a constraint. MPCCS is primarily designed for Ground communication and does not require astronaut crew intervention, but indeed allows access from/to the System. MPCCS is built modular and can be maintained on modular basis; its architecture allows further growths potential with each participating network member. With MPCCS, Columbus will provide effective network transmission services, storage services, data processing services and stable configuration for System Data acquisition devices, based on IP Communication.