LESSONS LEARNED FROM IMPLEMENTING NON STANDARD SPACEWIRE CABLING FOR TACSAT-4

Session: SpaceWire Test and Verification

Short Paper

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ABSTRACT

The rapid integration, launch, and deployment of satellites in response to emerging needs has been termed "Operationally Responsive Space" (ORS). One vision of ORS calls for the positioning in a depot of interchangeable satellite payloads and spacecraft buses with a common interface. Upon direction to deploy a particular mission, the appropriate payload would be selected and integrated with a bus, and the space vehicle would be launched. To support such a system, standardized hardware and software interfaces are needed between the payload and bus. For the development of ORS Bus Standards, the SpaceWire standard (ECSS-E-50-12A) has been specified as part of such a payload-bus interface for high rate data. The TacSat-4 satellite, part of the USDOD TacSat experiment series, is intended as a combination of a prototype ORS Standardized Bus for small satellite national security missions and an example payload. This implementation includes an instance of the SpaceWire interface called out in the ORS Payload Developer's Guide. The need for non-standard spacewire connectors has been established in previous studies. Such deviations are justified to get more performance or better human factors engineering. When these deviations from a standard are undertaken, extra effort is required to validate the implementation. Often these efforts result in valuable lessons learned. Investigation and testing described in this paper details our recent efforts, at the Naval Center for Space Technology, to design and qualify for flight on TacSat-4 a non-standard SpaceWire link. This paper will also cover performance, details on qualification, and lessons learned from environmental testing performed during TacSat-4 flight qualification.