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SPACE SYSTEMS SYMPOSIUM (D1)
Hosted Playloads - Concepts, Techniques and Challenges, Missions and Applications (7)

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MODULAR AND ADAPTIVE METHODS FOR HOSTED PAYLOADS

Abstract

Increasing demands to reduce the costs and improve timeliness for space-based missions have led to new challenges and created new opportunities. In response to these new challenges, both commercial and government space industries have embraced hosted and rideshare payloads as a way to minimize the costs and reduce timelines associated with the development, launch and operations of space-based missions. However, most hosted and/or rideshare payload activities are focused on optimizing the design for a single mission or task, often resulting in repeating unnecessary design and support activities, as well as duplicative ground/support operations. This paper presents a baseline architecture, implementation and Concepts of Operation (CONOPS) that dramatically changes the way rideshare, hosted and coincident hosted-hosted payloads can be quickly and cost effectively designed and deployed to achieve an assortment of space mission objectives from within the same physical payload. This architecture and existing suite of "applications" dramatically reduces the development timeline, enabling the synchronization of hosted payloads, (commercial and government) to commercial satellite build and launch tempos. In summary, an architecture is presented that provides a common electro/mechanical interface coupled with payload-level power, EMI/EMC, thermal management, encryption and host spacecraft interfaces. Integration of multiple payloads are shown to highlight the flexibility of the overall architecture. Further, this architecture affords re-use of pre-existing "applications" or processing algorithms and waveforms as well as leveraging ground infrastructure for additional processing and data dissemination. By enabling multiple auxiliary payloads within a given physical chassis, system designers and mission planners can focus on their specific missions and technologies, since common elements (e.g., Power, EMI/EMC, etc.) are already provided. This allows for significant cost savings for individual missions since these common elements are provided as part of the overall hosted payload architecture. In addition to enabling a streamlined and cost effective architecture for custom built mission payload hardware, many missions will be able to take advantage of pre-existing digital and RF processing hardware and a reprogrammable software environment, thereby further reducing the upfront Non-Recurring Engineering (NRE) costs. Lastly, space proven payloads successfully flying this architecture further reduce the risks associated with actual hosted/auxiliary payload operations. Bus providers and owner-operators are able to maximize their resources with minimal risk based upon vetted designs and business/contractual documentation. The establishment of a modular hosted payload architecture provides a significant cost and time savings opportunity for space-based missions willing to leverage work that has already been done.