IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
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ARCHITECTURES TO ENABLE SURFACE TO SPACE INTEGRATION

Abstract

regularly deorbiting systems comes the need to safely interoperate with airspace systems. As commercial space grows, it must do so without harming airspace operation. Further, as high-altitude airspace systems also come on line, a joint approach to managing the architectural considerations and enablers extending from surface-to-space (S2S) is needed. Currently, space and airspace systems are managed in a static and segregated fashion. Effectively, the transition region from FL600 to LEO is effectively self-governed. Access to space is established in a comparatively manually intensive manner, with each event having limited data sharing, and limited surveillance in the transition region. This has been demonstrated to be a highly safe process, but does not efficiently scale to large numbers of launches and reentries in the future. Economic vitality for both space and aviation requires: a timely, cost effective approval process, assurances for those at the leading edge who are coordinating in good faith based on global norms, and transparency in granting access as to the cost and impact on aviation and space operations. Civil safety must be ensured through integration of plans and actions, management of safety risks from new launch sites, rockets, space vehicles and satellites, for new entrants above FL600. National Defense must address the emerging contested space environment to operate through natural and human-caused threats. MITRE developed key operational principles and a framework for modeling and simulation to serve the community needs for collaboration on the solutions. We captured a future view with more structured flows of predictable launch and reentry using dynamic separation, and flight rules for coordinated action. The entire process from concept generation to flight will require mission brokers using streamlined approval processes. The future system will set and arbitrate resource use priorities in an agile fashion and provide rapid contingency planning. It will feature cross-agency integration of all transition actions, and develop safety performance standards from analyses using data sharing networks and utilize independent government surveillance and analysis. This paper will show progress from MITRE engagements with the community identifying key architecture-enabling approaches for this future view, such as 'one-stop shopping' for regulatory oversight; shared data repositories for real-time operations and information sharing approaches between owner operators to enable safety at large scales.