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FACILITATING SUSTAINABLE COMMERCIAL SPACE TRANSPORTATION THROUGH AN
EFFICIENT INTEGRATION INTO AIR TRAFFIC MANAGEMENT

Abstract

The emerging market of Commercial Space Transportation (CST) is developing not only efficient and cost effective access to space but is also fostering new concepts of passenger transportation. As an effect an increase of spaceflights and suborbital launches can already be observed over the past years and further growth is expected. The same applies to the number of spaceports for launch and landing operations of space vehicles worldwide. That said, space vehicles will more frequently pass through civil airspace and will evolve from rare special events to regular airspace users. The need for a safe and efficient integration of space vehicle operations into the air traffic system is evident. Considering concepts of very high-speed intercontinental passenger transport via suborbital point-to-point flights, this integration issue is becoming even more relevant. Air Traffic Management (ATM) is playing a key role in the effort to ensure a sustainable commercial space transportation system. The ATM integration concept has to follow a common approach which can accommodate all different types of commercial space vehicle operation. It must be flexible and resilient enough to handle the uncertainties of launch and re-entry events and provide measure to cope with a still significant lower target level of safety associated with space flights compared to commercial airplanes, ATM regularly is dealing with. It has to be the goal to integrate all operations into one system to ensure a seamless and efficient approach. The paper describes the necessary evolvement from the current state of the art of integrating spaceflight into ATM to a concept that facilitates the requirements of trajectory based operations under the regimes of future Single European Sky (SES) and the U.S. Next Generation Air Transportation System (NextGen). It shows how dedicated CST services for the System Wide Information Management (SWIM) can facilitate a robust ATM integration. To study the effects of space vehicle operations on air traffic and to evaluate mitigation strategies and optimized ATM integration, a case study design, based on a point-to-point suborbital intercontinental passenger transport concept, will be presented.