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AN ATTRIBUTIONAL ASSESSMENT OF A PROSPECTIVE GLOBAL SPACE TRAFFIC MANAGEMENT SYSTEM

Abstract

In recent discourse within the space domain, the necessity of a global Space Traffic Management (STM) system has been a subject of debate among stakeholders. Currently, both commercial owner/operators and national/organizational entities rely on their individual algorithms and procedures for tasks such as traffic coordination, conjunction analysis, and collision avoidance. Despite pioneering efforts in the market, emerging players in the commercial Space Situational Awareness/Space Traffic Management (SSA/STM) sector struggle to secure significant clientele. Illustratively, the latter half of 2023 saw over 25,000 collision avoidance maneuvers for Starlink satellites alone. Extrapolating this growth rate of objects in space to 2050 and beyond suggests a substantial increase in potential conjunctions, necessitating a global system for swift coordination to maintain space sustainability. NASA's projections indicate around 100 confirmed collisions within the next two centuries, highlighting an urgent need for global policy and legal deliberations to establish a comprehensive STM framework.

Before conceptualizing such a framework, it is imperative to acknowledge the principles of equity, intersectionality, and empathy in managing the space environment as a global common resource, accessible to all nations, rather than solely catering to present-day spacefaring entities.This policy paper, a collaborative effort by young professionals within the Space Safety and Sustainability Project Group at the Space Generation Advisory Council, undertakes a comprehensive review of international legal frameworks, multilateral initiatives, and private sector endeavors. The analysis identifies potential gaps that could impede future developments in traffic management and coordination. Within the international legal framework, key treaties such as the Outer Space Treaty of 1967 and subsequent agreements, along with multilateral initiatives like the International guidelines for Orbital Debris Mitigation and efforts by the UN Committee on the Peaceful Uses of Outer Space, are scrutinized. Private sector initiatives from organizations such as the Space Data Association and the Space Safety Coalition are also evaluated. By assessing these frameworks and initiatives against hypothetical failure scenarios and their impact on the space environment, the paper identifies both technical and non-technical gaps. Subsequently, it discusses the desired attributes of a global STM system, emphasizing modularity, decentralization, standardization, rigor, robustness, intersectionality, attributability, and equity. These attributes are examined across technical, legal, and policy dimensions, considering diverse stakeholders including public, private, defense, and organizational entities. The culmination of this research presents a set of proposed guidelines, serving

as a foundational framework for future endeavors towards a global STM system, encompassing technical, legal, and policy perspectives.