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INTERNATIONAL SPACE SITUATIONAL AWARENESS SYSTEM FOR AVOIDING ORBITAL
COLLISIONS: FRAMEWORK, CHALLENGES AND RECOMMENDATIONS

Abstract

With the rising number of space objects including orbital debris, space becomes more and more congested. In order to effectively avoid orbital collisions, a comprehensive Space Situational Awareness (SSA) system is required. Considering the practical issues such as the huge costs and deploying location needed for the best coverage of SSA infrastructure, no spacefaring nations can establish such a system solely. Fortunately, an international SSA system based on the existing SSA networks or systems, no matter military, civil or commercial, can fulfill the requirement. A leading entity which falls under UNCOPUOS and UNOOSA is needed for establishing such an international SSA system, and it is responsible for constituting SSA data sharing standards and regulations. moreover a technology committee composed of worldwide space subject experts should be appointed to supervise the SSA data for their reliabilities and impartialities. An operational entity staffed by representatives from all participants should be established to run daily SSA data collection, processing and distribution. However, there are many challenges to be overcome before the system really run. One is the imbalance of SSA capabilities among spacefaring nations, for example, only USA and Russian have SSA networks though they are far from satisfactory, which makes data exchanging on an unequal footing and data verifying impossible. Another challenge is that the majority of the existing SSA systems are mainly coupled with military aims, which lead to the distrust among the participants, especially those who are rivals. The third challenge is that there are no many technical practices which simultaneously satisfy the needs for data sharing and protection of sensitive information internationally. However, there are many efforts can be taken in spite of these challenges. One recommendation is that the spacefaring nations should do their best to develop their own SSA capabilities. Another is the international cooperation mechanism should piggyback on existing fruitful cases such as CFE Program and Space Data Association. The last is that the participants should collaboratively develop and demonstrate new technologies such as cryptography which can improve SSA data and information sharing while reducing their worry about data security.