19th IAA SYMPOSIUM ON SPACE DEBRIS (A6)
Operations in Space Debris Environment, Situational Awareness - SSA (7)

Author: Mr. Vincent Morand
Centre National d'Etudes Spatiales (CNES), France, vincent.morand@cnes.fr

Dr. Igonn Urdampilleta
CDTI (Centre for the development of Industrial Technology), *(country is not specified)*,
igone.urdampilleta@cdti.es
Dr. Elena Vellutini
Italian Space Agency (ASI), Italy, elena.vellutini@asi.it
Mr. José Freitas
Portugal, jose.freitas@defesa.pt
Dr. Daniel García Yárnoz
European Union Satellite Centre (SatCen), Spain, daniel.garcia@community.isunet.edu
Mr. Johannes Gelhaus
Technische Universität Braunschweig, Germany, *(email is not specified)*

EVALUATING THE PERFORMANCE OF CURRENT AND FUTURE EU SPACE SURVEILLANCE AND TRACKING SYSTEM

Abstract

The "Decision of the European Parliament and the Council Establishing a Space Surveillance and Tracking Support Framework" was adopted on April 16th 2014. It has established the SST Support Framework with the general objective to contribute to ensuring the long-term availability of European and national space infrastructure, facilities and services, providing support to the actions aimed to establish a SST capability at European level and with an appropriate level of European autonomy. The specific objectives of the SST Support Framework are to assess and reduce the risk to in-orbit operations of EU spacecraft from collisions, to reduce the risks related to the launch of EU spacecraft, to survey uncontrolled re-entries of space objects into the Earth's atmosphere and to seek the prevention of proliferation of space debris.

To attain these objectives, the SST Consortium, which is built by the participating Member States in coordination with the European Union Satellite Center (SatCen), operates a network of Member State ground-based sensors (radars, telescopes and lasers), to survey and track space objects and to produce a database thereof, and derived information. Finally, SST services (i.e. collision avoidance, re-entry analysis and fragmentation analysis) are provided to different users (i.e. Member States, Council, Commission, EEAS, public and private spacecraft owners and operators, public authorities concerned with civil protection) via the EUSST Service Provision Portal. The initial services started in July 2016 and from this date continuous improvements are being made. As of 2020, a pool of 51 telescopes, 14 radars and 5 lasers are operated within EUSST.

This paper deals with the design and performance estimation of the current and of potential future EUSST sensor networks through extensive simulations. First, individual sensors, both existing and to be developed, are modelled according to their performances and corresponding surveillance strategies. Different levels of performance can be considered for each sensor depending on potential future upgrades. Then, coverage and cataloguing simulations are performed with respect to ESAs MASTER 2040 population: each sensor's added value is assessed by analyzing how it can contribute to the overall system

performance. This allows the design of the architecture showing best value for money while estimating the current and future performance of the EUSST network.