TECHNICAL ANNEX
FOR SUBCONTRACT "1SST2018-20_INAF_3"
GRANT AGREEMENT N. 299-G-GRO-COPE-19-11109

External support to the network data processing, calibration campaign assessment and operations activities.

Introduction

The growing number of active and inactive satellites, and space debris (typically fragments generated from the break-up of operational satellites or abandoned upper stages of launchers) represents nowadays a serious risk for space governmental and commercial activities. The European Commission (EC) initiated the European Space Surveillance and Tracking (EUSST) Support Framework programme to survey and track these objects in Earth orbit, with the aim of implementing a European network of sensors for surveillance and tracking of objects in Earth's orbit. EUSST supports such an initiative by providing cataloguing, fragmentation monitoring, conjunction analysis, and reentry monitoring services.

The BIstatic RAdar for LEo Survey (BIRALES) sensor is among the Italian contributions to EUSST and it is operated by INAF. Since the establishment of the EUSST Framework, BIRALES has been contributing to the EUSST services by providing measurements acquired for survey and tracking requests. To be operated, BIRALES needs support for proper observation scheduling, sensor calibration, measurements correlation (which exploits the multibeam nature of the sensor), and, more in general, data processing for any high interest events.

Description of work

This paragraph describes the activities to be performed. The subcontracting activity is related to WP4 (sensor function) and concerns the operation of BIRALES. This is divided in three main work packages:

1. Support to sensor scheduling, by defining the optimal observation strategy of each task and the sensor pointing angles;
2. Maintenance of the software backend. It includes the verification and validation of the recently upgraded correlation software, which has been adapted to new operative modes of the sensor, and the monitoring of the associated performances (measurements analysis in terms of accuracy, detections, number of correlations and other metrics);
3. Data processing in case of re-entries and fragmentations.

The activities are divided in three work packages, whose objectives are detailed in the dedicated tables below.

WP 4.1: Sensor scheduling	
Start: T0	**End:** T0 + 6 months
Objective The objective of this work package is the support to the operational activity of the sensors, in terms of definition and coordination of the observations.	

WP 4.2: Technical support of the software backend: maintenance and verification	
Start: T0	**End:** T0 + 6 months
Objective The main goal of this package concerns the maintenance and verification of the software backend, to ensure that the sensor is well calibrated (to fulfil the requirements of calibration campaigns) and it is correctly correlating measurements for the generation of the TDMs	

WP 4.3: Data processing for High Interest Events	
Start: T0	**End:** T0 + 6 months
Objective The goal of this package is devoted to the processing of BIRALES measurements in case of High Interest Events, such as re-entries and fragmentations, for which tailored techniques may be needed. In addition to provide Tracking Data Message, the data shall be processed also to characterize, if possible, the objects in terms or tumbling motion or Radar Cross Section.	

Deliverables

List of deliverables			
Deliverable Number	**Deliverable Title**	**Type**	**Due Date**
D4.2.1	Updated version of the software architecture document	Report	T0+6
D4.2.2	Updated version of the developed software	Software	T0+6