

SPACE DEBRIS SYMPOSIUM (A6)  
Measurements and Space Surveillance (1)

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DEFINITION OF GROUND SEGMENT REQUIREMENTS FOR A UHF RADAR FOR THE  
EUROPEAN SPACE SITUATIONAL AWARENESS SYSTEM.

**Abstract**

ESA has launched a nine months long study to define the requirements associated to the ground segment of a UHF (300-3000 MHz) radar system. The study has been awarded in open competition to a consortium led by Onera, associated to the Spanish companies Indra and its sub-contractor Deimos.

The main mission for the radar system is to build and maintain a catalogue of the objects in Low Earth Orbit (apogee lower than 2000km) in an autonomous way, for different sizes of objects, depending on the future successive development phases of the project. The final step must give the capability of detecting and cataloguing 10 cm objects, with a possible upgrade to 5 cm objects. A demonstration step must be defined for 1 m objects. These different steps will be considered during all the phases of the study.

Taking this mission and the different steps of the study as a starting point, the first phase aims to define a set of requirements for the radar system. The constraints derived from the targets (in terms of distribution and characteristics) and their environment (especially ionosphere related propagation phenomenon) are gathered. Ensuring the cataloguing mission leads to define requirements to get sufficient number of good quality plots. Other important issues also have to be taken into account for the selection of concepts: costs, logistics (maintenance and lifetime), environmental security (due to high emitted power) and legislation (authorized frequency bands).

On the basis of these requirements, different monostatic and bistatic concepts of radars are proposed and compared. These concepts cover a wide combination of parameters, either material or functional, aiming to fulfil the previously defined requirements. The objective is to find innovative feasible solutions, regarding the ambitious mission.

Among the concepts, two are chosen for further analysis and design in the third phase. Optimisation of the architectures and better definition of costs, risks, schedule and performances are the drivers in this phase of the study.

Finally, one single concept is retained. Detailed analysis of the radar system provides equipment level design, infrastructure and interfaces. Costs of the elements of the system are to be estimated. A detailed roadmap shows how the deadlines can be met to ensure demonstration phase by 2011 and full system capability by 2018. The critical technologies and risks are identified.

The presentation will show the drivers for requirements and detail the analysis, comparison and selection of the concepts until the last one.