

SPACE SYSTEMS SYMPOSIUM (D1)
Space Systems Architectures (4)

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SYSTEM-LEVEL ARCHITECTURE TRADES FOR A EUROPEAN SPACE SITUATIONAL
AWARENESS SYSTEM

Abstract

Europe is currently defining requirements and studying options for the development of an independent space surveillance and space situational awareness system. This system will provide independent detection, tracking and cataloguing services for orbiting objects, as well providing information on the space environment and threats to space system users. Previous studies have identified radar systems for LEO surveillance and optical telescope systems for MEO and GEO surveillance. In the framework of a pan-European study team, possible architecture options for a European space surveillance system have been investigated and traded-off. Architectures have been compared by considering the system performance (sensitivity, timeliness and accuracy), complexity, risk, robustness, cost and security. Ground- and space-based assets are considered. It has been found that a mix of ground and space-based assets provides the best overall solution to meet the user requirements in terms of providing the necessary level of service to users. Ground based radar systems are the best option for LEO surveillance, but for MEO and GEO surveillance, a mix of ground- and space-based optical sensors provides the best solution to provide routine tracking and catalogue maintenance, whilst allowing new events (e.g. fragmentations and maneuvers) to be detected with a high degree of confidence and timeliness. For space weather and environment awareness, in-situ monitoring devices on orbiting platforms coupled with data from solar observatories at the Lagrange points (e.g. Soho, ACE) will be key elements of any operational system.