

SPACE OPERATIONS SYMPOSIUM (B6)  
Mission Operations, Validation, Simulation and Training (3)

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GALILEO FIRST ARIANE5 LAUNCH – ADAPTING TO FOUR-SPACECRAFT LEOP OPERATIONS

**Abstract**

Galileo is European Union's Global Satellite Navigation System providing radio signals for position, navigation and timing purposes, as well as search and rescue services. The Galileo constellation is now made up of 18 satellites placed on Medium Earth Orbits, and the initial services have been declared open by the European Commission in December 2016.

To achieve this initial constellation, seven Soyuz rockets launched between 2011 and 2016 each placed a pair of Galileo satellites in orbit. On 17th November 2016, the eighth Galileo launch performed with Ariane5 was the first to benefit from the increased launcher capacity, allowing for the orbit positioning of 4 Galileo satellites at once.

This increased capacity required the joint LEOP teams of CNES and ESOC to adapt their operational organization and ground facilities to be able to operate the 4 satellites simultaneously. This had to be achieved with minimal changes to infrastructure while meeting high-level requirements similar to those of Soyuz launches.

These adaptations required tests and training over the short 6-month time-frame between the L7 Soyuz launch in May 2016 and the L8 Ariane5 launch in November 2016. A dedicated set of simulations was performed to validate the changes to the operational concept, followed by a full-scale simulation campaign focusing on the new teams compositions and roles.

This paper will address the main challenges faced when adapting from the 2-spacecraft to a 4-spacecraft configuration while maximizing the reuse of the dual-launch experience, and give an overview of the key parameters which required some tuning in the frame of the new organization. It will also synthesize the lessons learned after successful L8 LEOP on the 4 Galileo spacecraft, and possible foreseen optimization for the upcoming Ariane5 launches to be performed by CNES, in which cost reduction while maintaining a high level of safety will become the key driver in the setup of Galileo operations.

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