SPACE OPERATIONS SYMPOSIUM (B6)
New Operations Concepts (2)

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A CORE CONTROL SEGMENT FOR EARTH OBSERVATION MISSIONS

Abstract

VEGA Space has built upon 30 years of experience in the domain of space control segment development to integrate a ground control segment infrastructure based on ESA and VEGA components. This infrastructure is a core system that can be easily customized, configured and deployed to support Earth Observation missions compliant with the ESA ECSS Packet Utilisation Standard and the CCSDS Space Link Extension protocol.

The system is available under LINUX and relies on a combination of dedicated developments and open-source software.

The core of the infrastructure includes three main components: a mission control system, a mission planning system, and an operations preparation environment. In addition, an operational simulator and a training system are provided for testing purpose and operator training.

The mission control system is based on ESA's SCOS-2000 generic mission control system, which provides a highly customisable and configurable solution for the spacecraft monitoring and control. It includes a telemetry processing and display, commanding, house keeping telemetry and data archiving, as well as data dissemination.

The planning component is based on the VEGA Planning Toolkit for Earth Observation (VPT-E), an infrastructure for mission planning system development including an application framework and a toolkit of planning algorithms that can be used to develop specific solutions. In the absence of a dedicated flight dynamics component, it also includes the routines for basic orbit propagation and environmental assessment required for simple Earth observation missions.

The operations preparation environment is based on the VEGA Operations Preparation Environment (OPE). It provides an editor for operational procedures and for a SCOS-2000 compliant spacecraft database.

The VEGA control segment infrastructure has been configured and deployed as part of the International Space Innovation Centre (ISIC) ground segment to support an earth observation demonstration mission (LEOSAT). This activity has illustrated the need for flexibility in supporting the non-standard interfaces of the ground control segment, especially at the level of the programming chain for interaction with the user or payload data segment and the external ground station providers at management level.

The paper will present the characteristics and benefits of the VEGA control segment, and will come back on the lessons learned from its integration within ISIC. It will describe how the solution can be extended to cover the full control segment, and will briefly address the plans for the VEGA solution to the user / payload data segment integration.