

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

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FROM CRADLE TO GRAVE – TEST, VERIFICATION AND MISSION CONTROL IN A LIGHTSAT  
PROJECT

**Abstract**

**Purpose:** This presentation is a use case of how the multi-satellite formation flying project PRISMA solved its need for a general, software-based system that could be used for test, verification and mission control throughout the complete lifetime of the project, moreover on a limited budget. To be able to adapt the system along the progress of the project there were also a need for a system that was flexible and easy to add new functionality to depending on system requirements. The purpose of this presentation is to describe the methods used in the PRISMA project for fulfilling these requirements throughout the whole project, from cradle to grave.

**Methodology:** An ongoing in house project with an IP-based network utilizing multicasting with a distributed functionality was selected for the PRISMA project instead of a client-server solution. This made the entire test system more flexible since it became easy to attach to or remove *user nodes* from the system. A *user node* can consist of any standard PC using the same network interface as all of the other user nodes. By distributing all of the data onto the network, both telecommands and telemetry, any user attached to the network have the ability to listen to the data of interest or to send out data on the shared network. The result is a scalable plug-and-play system that enables for easy configuration of test setups. A user may simply take a laptop, plug it into the network, and start collecting data or commanding the satellite simulator used in the PRISMA project for hardware-in-the-loop tests. In this way the PRISMA project has had a test platform during the whole project that has adapted along the way when entering new phases in the project.

**Results:** An in house project of developing a ground system that today is called RAMSES (Rocket and Multi-Satellite EMCS Software) has in parallel with the PRISMA project been developed with the features described above. RAMSES is a collection of applications and libraries that the PRISMA project made use of for its test and mission control setup. Together it is a general ECSS (European Cooperation for Space Standardization) and CCSDS (Consultative Committee for Space Data Systems) compliant

ground control system.

**Conclusions:** For the Swedish Space Corporation with the methodologies used in RAMSES and PRISMA, this has been a success since the system is now being reused in other LightSat- and sounding rocket projects.