

15th SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)
Small Earth Observation Missions (4)

Author: Ms. Kaja Aßmann

OHB System AG-Bremen, Germany, assmann@ohb-system.de

Mr. Martin Kassebom

OHB System AG-Bremen, Germany, kassebom@ohb-system.de

Mr. Hartmut Bothmer

OHB System AG-Bremen, Germany, hbothmer@ohb-system.de

Mrs. Pamela Froehner

OHB System AG-Bremen, Germany, froehner@ohb-system.de

Mr. Andreas Hoffmann

OHB System AG-Bremen, Germany, hoffmann@ohb-system.de

Mr. Kai Lenfert

OHB System AG - Munich, Germany, kai.lenfert@kayser-threde.com

ADVANCED ON-BOARD OPERATIONS CONCEPT – ENMAP SATELLITE BUS

Abstract

The Environmental Mapping and Analysis Program (EnMAP) is a joint German initiative under the scientific leadership of the GeoForschungsZentrum (GFZ) Potsdam. In the EnMAP project OHB-System is responsible for the satellite bus, where the company Kayser-Threde, is the industrial prime contractor for the EnMAP space segment, and is responsible for the Hyper Spectral Imaging Payload. The EnMAP project is carried out under contract to the German Space Agency DLR with funds of the German Federal Ministry of Economic Affairs and Technology under grant No. 50 EP 0801. The EnMAP satellite will be operational in 2014 with a mission duration of 5 years.

EnMAP provides high quality hyperspectral Earth observation data on a frequent basis. The EnMAP information is based on about 230 spectral bands in the wavelength range from 420 nm to 2450 nm at a ground sampling distance of 30 m x 30 m and with an imaging capacity of at least 5000 km per day.

The design of the EnMAP satellite bus is close to its finalisation at the end of Phase C. The first part of this paper covers the basics of the current design. Subsequently the advanced on-board operational concept of the EnMAP satellite bus is presented in detail. An emphasis is laid on the applied one-telecommand-philosophy for the most common daily operational tasks: Image acquisitions, payload data download and payload data deletion.

For an image acquisition several subsystems have to be activated, controlled and coordinated simultaneously. Using one telecommand for each subsystem, or even for each operation within the different subsystems, would lead to a great amount of telecommands. The EnMAP satellite bus' operational concept includes an autonomous on-board handling of these processes and thus requires only one telecommand per commanded sequence, including image acquisitions, payload data download and deletion. The payload data is autonomously compressed on-board, and, depending on the downlink duration, a matching amount of data is transmitted to the ground station. This advanced on-board operational concept results in a very low effort for on ground modelling of on-board resources and mission planning for nominal operations. Especially for missions requiring only one individual satellite this is an advantage, and also for target and event observation scenarios, in which no permanent or repeating activities are performed. Due to this, the EnMAP satellite bus turns out to be a very suitable and cost effective platform for small earth observation satellites.