

Preface

The Combined Data and Power Management Infrastructure (CDPI) described in this book is a functional merging of a satellite Onboard Computer and a Power Control Unit. It was developed in the frame of the Small Satellites Program at the University of Stuttgart, Germany.

In 2009, the need became evident for a suitable Onboard Computer design for the small satellite FLP (also known as “Flying Laptop”). It had to meet the stringent performance, mass, volume, and power consumption constraints imposed by the 130 kg FLP satellite, with its full-featured ACS, diverse payloads, and complete CCSDS telecommand and telemetry standard compliance.

Thus one of my first tasks as senior engineer was to identify a design for an onboard computer which was required to be

- space proof w.r.t. radiation hardness and electromagnetic space conditions,
- compact enough for the target satellite platform (a cube of 60 x 70 x 80 cm),
- powerful enough to run a realtime operating system,
- suitable to support professional CCSDS-based satellite operations,
- and limited in power consumption.

Consumer electronic components for the onboard computer were out of the scope of this project considering the need for robustness against the space environment. Classic space industry OBC devices were not appropriate with regard to geometry and mass, much less cost considerations. The only realistic option was to find consortium partners from the space industry with expert knowledge in diverse fields who could supply the institute with Onboard Computer components—altogether forming a complete, redundant OBC. Thus the task was to define a completely modular, “LEGO® like” design which allowed the subcontracting of entire functional OBC boards to consortium partners. The overview of the achieved design solution is described in [Chap. 1](#).

The requirements on the OBC system, especially with respect to potential hardware failure robustness and the handling of different types of external analog and digital interfaces, led to a functional merging between OBC and the satellite’s Power Control and Distribution Unit (PCDU), resulting in a very innovative design—the so-called CDPI.

At end of the flight unit's development the consortium decided to provide a single consistent documentation of the developed CDPI Infrastructure. The technical overview should be available for other university students in a sort of mix between technical brochure and user guide. This book also might be of interest for future university or industry partners who intend to order in Stuttgart rebuilds/adaptations of the CDPI infrastructure or even the entire satellite bus for their missions.

December 2012

Prof. Dr.-Ing. Jens Eickhoff

<http://www.springer.com/978-3-642-35556-1>

A Combined Data and Power Management

Infrastructure

For Small Satellites

Eickhoff, J. (Ed.)

2013, XXIV, 249 p. 140 illus., 115 illus. in color.,

Hardcover

ISBN: 978-3-642-35556-1