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THE DESIGN AND IMPLEMENTATION OF LEON BASED COMMAND AND DATA HANDLING  
SUBSYSTEM FOR NARO SATELLITE OF KOREA

**Abstract**

The first space launcher in Korea, Naro will take off with Korean science and technology satellite STSAT-2C(NARO Satellite) in 2012. This paper describes the design and implementation of Command and Data handling Subsystem(CDS) for NARO Satellite. CDS of NARO Satellite is composed of On-Board Computer(OBC), Data Storage Module(DSM), I/O Module(IOM) and Low Voltage Power Supply(LVPS). OBC manages the spacecraft and payload according to the schedule set by Ground Station(G/S) and provides environment for ACS(Attitude Control Subsystem) Flight Software, DSM stores payloads data and sends them to the G/S via X-band RF channel and IOM apply bi-level commands and samples the analog and digital sensors. CDS of NARO Satellite is on-orbit reconfigurable subsystem which is based on Leon3 Fault Tolerant Processor by uploading FPGA code and Flight Software Code. By which we can modify, upgrade and even change the system during mission. For reliable system Triple Module Redundancy(TMR) technology and configuration memory scrubbing algorithm is applied to protect FPGA and Error Detection and Correction algorithm(EDAC) is also applied to protect memories in space application. Many functions are implemented in FPGA such as Reed-Solomon code, lossless compression code and Protocol Processing code of NARO Satellite for high speed data processing. Electrical Function test and space environment test was successfully performed and it satisfies the requirements of NARO Satellite.