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THE SMALL-SAT-EGSE: A COST-EFFECTIVE SMALLSAT DEVELOPMENT AND VERIFICATION
PLATFORM

Abstract

For SmallSats the failure rate is still relatively high, often due to budget/schedule constraints for testing and a lack of thorough functional verification. Specifically the infrastructure to be used for verification and testing requires a relatively high investment and development/adaptation effort. Having a common Electrical Ground Support Equipment (EGSE) baseline implementation for SmallSat missions would ease the verification and validation process and would therefore increase the success rate of upcoming missions. This paper describes an activity that adapts the ESA provided infrastructure for usage in SmallSat missions.

The SmallSatEGSE represents a cost-effective, site-to-site inter-connectable, and easily extensible rapid development platform for SmallSat mission technologies. The system comes as a pre-configured core EGSE in a virtualized environment with adaptable hardware Special Check-Out Equipment (SCOE) interface cards, based on system on chip technology. The core EGSE machines and containers are virtualized on a hypervisor, allowing easy extension of the underlying server hardware as well as a secure EGSE site-to-site interconnection via VPN for larger validation campaigns. The system is based on space-specific technology as well as on familiar and modern COTS DevOps technologies. Current feature candidates are a mission control system, a central checkout system, a space system simulator, a SCOE hardware and software development environment, SCOE SmallSat onboard bus interface implementations and many general support services like clock synchronization, user management, version control, media library etc. The core system presented here fits in a medium-sized desktop server but can be grown to an arbitrary large facility with heterogeneous hardware and with little to no vendor lock-in.

The system is currently under development at ESA ESTEC, integrating new developments such as the European Ground System - Common Core (EGS-CC) and will be evaluated against an onboard computer at the end of the year. This paper elaborates the system design and its primary use-case configurations, as well as the current state of the project.