SMALL SATELLITE MISSIONS SYMPOSIUM (B4)
Small Satellite Operations (3)

Author: Prof. Marco Schmidt
University Wuerzburg, Germany, marco.schmidt@hs-bochum.de

Prof. Klaus Schilling
University Wuerzburg, Germany, schi@informatik.uni-wuerzburg.de

EVALUATION OF THE CUSS SATELLITE SCHEDULING SYSTEM WITH RESPECT TO REAL WORLD SCENARIOS

Abstract

Many projects with the objective to establish ground station networks were initiated due to the huge amount of small satellites launched in the last years. Those ground station networks were built up mainly from academic institutions and are used to communicate with their corresponding satellites. An important fact is, that these ground station networks are not interconnected to the ground station networks of the space agencies (like NASA or ESA) and have furthermore different operational requirements [1]. Nevertheless scheduling is an important issue in all kind of ground station networks to improve efficiency and resource utilization [2]. The CUSS scheduling system, developed at the University of Wuerzburg, contains a tailored approach to satisfy the specific needs of academic ground station networks.
The paper shows in detail how the CUSS scheduling system performs with respect to different real world scenarios. Classical satellite scheduling systems compare the performance of their algorithms mainly by the amount of unsatisfied requests [3]. But this parameter is not really expressive for the Redundant Request Satellite Scheduling (RRSS) problem, due to special characteristics of requests with redundant scheduling requirements. Hence, different parameters were analyzed for evaluation of the search and scheduling algorithms, for example total schedule creation time and results from the optimization function. The results from the experiments show the advantages of the CUSS scheduling system. Especially with respect to schedule creation time the system proofs to be very robust and delivers in extremely short time frames reasonable schedules. The number of unsatisfied requests can be handled by simple means through adapting the request time frames. The conclusion explains the impact for future satellite scheduling applications, especially in the scope of small satellites.

[1] M. Schmidt and K. Schilling. Satellite scheduling for educational ground station networks. In IAC, number IAC-08-B4.3.6, 2008.

[2] L. Barbulescu, J.P. Watson, D. Whitley, and A. Howe. Scheduling space-ground communication for the air force satellite control network. Journal of Scheduling, 7(1):734, 2004.

[3] L. Barbulescu, A. A. Howe, J.P. Watson, and D. Whitley. Satellite range scheduling: A comparison of genetic, heuristic and local search. In Seventh International Conference on Paral-lel Problem Solving from Nature, 2002.