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HIGH EFFICIENCY AUTOMATIC SCHEDULER FOR A GROUND SEGMENT AS A SERVICE
PLATFORM**Abstract**

The nano, micro and small satellite market is growing continuously and is expected to do so even more in the coming years. Linked to this expansion is the increased demand in the development of dedicated ground segments, leading to the idea of ground segment as a service in this peculiar market.

Leaf Space has created Leaf Line and Leaf Key, two ways of providing tailored services for microsat operators. A winning aspect of these services is the capability to provide optimal schedules for the satellite contact windows over the ground stations network. Since smallsats are generally in LEO orbits, available contacts are very short-timed. This condition leads to a whole different way of scheduling available communication windows with respect to high-orbiting satellites. The necessity to work with SMEs and New Space startups brings even more challenges related to the flexibility and reliability required by such dynamic customers. These peculiarities require a new, powerful, tailored, very efficient scheduling algorithm, built from a highly constrained combinatorial optimization problem. Several approaches have been developed and compared. These algorithms are iterative and a lot of effort has been put into decreasing the size of the search space while satisfying the greatest number of constraints. The solutions obtained from such algorithms are not guaranteed to be optimal, but are reasonably close this condition. Moreover, a conflict solver logic has been developed in order to additionally increase the performance of the scheduling algorithm. A series of case studies have been performed and analyzed in order to highlight capabilities and improvements developed to meet the needs of several commercial missions. This paper presents the work done to improve the scheduling algorithm that is currently powering the Leaf Space Ground Station Network, a family of platforms solving the communication bottleneck for small sat operators.