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BRITE-AUSTRIA GROUND SEGMENT AND DISTRIBUTED OPERATIONS CONCEPT

Abstract

BRITE-Austria is the first Austrian satellite and is part of the Bright Target Explorer (BRITE) mission, a constellation of nanosatellites observing the brightness oscillations of massive luminous stars by differential photometry. Up to now, six satellites (two Austrian, two Polish, and two Canadian) are part of the constellation.

To operate the constellation, a network of ground stations has been established, including ground stations in Austria (Graz and Vienna), Canada (Toronto), and Poland (Warsaw). The operations concept for the mission foresees the use of a master station for each satellite, which serves as mission control centre and has the full control over the spacecraft, while the other stations are configured as relay and backup stations.

This paper presents the ground station configuration of the BRITE-Austria master station located at Graz University of Technology, showing a cost-effective approach of establishing a small satellite ground station. Subsequently, the operational concept for the mission with the established ground station network is described. Since all BRITE ground stations are configured in a similar manner and make use the same standards, they are fully compatible with each other. Therefore, each station can take over control of a spacecraft if required, increasing availability and introducing redundancy.

Furthermore, the standardization allows to use the ground station also for compatible upcoming missions, which helps mitigating costs in case of mission extensions by serving other missions in parallel. The ground station network makes use of automation by supporting remote access, maintenance, and operations. Operations run autonomously by predefined scheduled commands, which are uploaded to the spacecraft during a particular pass. In addition, automated software validates the received satellite telemetry, generates alarms in case of unexpected behaviour, and notifies the operators by email and text message. The paper concludes with first impressions, experiences, and lessons learned for the BRITE-Austria master station in Graz from the commissioning and early operations phase of the spacecraft after its launch in summer 2012.