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APPLYING A LOW COST GROUND SEGMENT NETWORK FOR OPERATION OF BUAA-SAT
WITH THE REMOTE CONTROL CAPABILITY

Abstract

For extending the downlink data capacity and shorten the waiting time to obtain telemetry and mission data, a ground segment network plans to develop to integrate several UHF/VHF amateur band and S band ground segments together. The first user will be BUAA-SAT program which is a 40 kg micro-satellite made by students from Beihang University aiming to demonstrate the concept of global air management and test the space camera from Swiss space center of EPFL. One point needed to emphasized is that the BUAA-SAT uses both UHF/VHF amateur band and S band onboard communication segments.

First of all, this paper briefly presents the fact that the communication system is a constraint for all of the satellite program. It limits the time that the satellite communication with the ground segment. One way to relieve this pressure is to use several ground stations located in different places of the worldwide as a network. The performance of the ground station network has been estimated by calculate the average access time and downlink data capacity. Several operation concept and scenarios is also discussed to extend the property of the ground station network.

Secondly, the general architecture of the ground station network is showed. It uses the TCP/IP protocol to commbine several ground stations to a network which allows the users to control a ground station in any places by internet. The ground station network employs a ground control system which includes several custom software to control the tracking system, process and archive the data both in the downlink and uplink channels. Considering the information security challenge, a secure shell is also added in the ground control system.

Then, a test procedure is made to test the real performance of the ground station network based on several levels. It verifies the remote control ability by control a ground station from the internet.

The paper finally gives the conclusion of configuration and operation of the ground station network. The obtained experience can be used to improve the performance of the ground station network in the future.