29th IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)
Interactive Presentations - 29th IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (IP)

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BIRDS-DB: A STORE AND FORWARD CUBESAT MISSION DATA MANAGEMENT AND DISTRIBUTION SYSTEM FOR GROUND SENSOR TERMINAL NETWORKS OF DEVELOPING COUNTRIES

Abstract

The increasing interest to use CubeSats for store-and-forward-based (SF) satellites as remote data collection systems have been demonstrated since 1990s. The SF technology is a key element to link sensor networks deployed on the ground for specific data collection purposes. In Kyutech, cube satellites such as the BIRDS satellites, KITSUNE/SPATIUM II on-board SF payload which is complimented by ground sensor terminals that collect specific data for its member countries. These payloads and ground sensor terminals not only aim to demonstrate technology but also build capacity for participating developing countries. Aside from the satellite with SF payload, the ground segment which involves the download, collection, storage, and distribution of data are also important for country-specific applications. In this paper, the design, development, and implementation of a data management and distribution mechanism for the store and forward mission of KITSUNE/SPATIUM II is presented. The online platform is designed to collect, store, and organize the SF data so that it can be distributed to the participating countries. To achieve this, the following system requirements were established: (1) archive the processed data and shall save the data in dedicated storage and (2) provide a mechanism to share the data among members of the ground sensor terminal (GST) network. The data storage mechanism involves the acquisition of primary satellite data stream during the reception at the ground station as saved in the ground station drive, data processing, evaluation, and product generation stored in temporary storage; and archiving of data for long term preservation of data in external drive and/or cloud storage. On the other hand, data handling using the back-end database is implemented by accepting SF data in a standard file format, encoding the

data through an online webpage with user access, and sharing data through data download and report generation. Initial beta test on the ground shows that the system can be accessed through dedicated user accounts per country, and different data formats can be uploaded to populate the database. Moreover, users were able to access their own data and download them for further processing and analysis. Finally, users were also able to generate reports based on the data in the database.