

29th IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)
Generic Technologies for Nano/Pico Platforms (6B)

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SMALL SATELLITES FOR CYBER SECURITY APPLICATIONS AT THE TU BERLIN - THE
RACCOON AND CYBEESAT MISSIONS**Abstract**

The protection of critical infrastructure is of high priority for the technical advancement and digitization of businesses around the world. The power generation and distribution sector has a particularly high relevance for modern economies. In the past years, a growing risk of cyber security threats has been observed. Especially during times of international crisis (e.g. COVID-19) an increase can be detected. Operators of power plants and energy distribution infrastructure are working on secure and reliable radio communication of their international network (e.g. remote/offshore wind turbines). Small and nano satellite platforms can offer new opportunities for space based services, such as the exchange of cryptographic keys between distant locations. Concurrently, the MarconISSta and SALSAT projects of the TU Berlin depict a potential increase in communication throughout certain frequency bands. This development may lead to unintentional interferences as well as targeted jamming events that can hinder space based cyber security solutions.

By way of the RACCOON project and CyBEEsat mission the Technische Universität (TU) Berlin intends to contribute a solution to both of the aforementioned issues. The RACCOON (Robust And seCure post quantum COmmunication fOr critical iNfrastructure) project aims to combine reliable radio communication and cybersecurity. The goal of the project is to develop an intelligent and robust RF transceiver for the exchange of quantum safe crypto keys for critical infrastructures (e.g. offshore wind farms). The precursor mission CyBEEsat (Cybersecurity Berlin Experimental Educational Satellite) aims to demonstrate the key transmission on-board a compact 1U CubeSat. CyBEEsat uses the newly allocated Short Duration Mission (SDM) band. The German Aerospace Center (DLR) has selected the mission to be launched on the maiden flight of the German Spectrum microlauncher by Isar Aerospace. The launch is scheduled for the end of 2022 from the Andøya Space Center (Norway). The CyBEEsat mission will be executed by the chair of space technology of the TU Berlin in partnership with the Berlin Nanosatellite Alliance (BNA). The satellite is being developed and manufactured within nine months.

This paper will introduce the CyBEEsat platform and its final flight configuration. This includes the miniaturized on-board electronics and communication subsystem for the key transmission in the SDM band. Additionally, the technical concept of the RACCOON project and its use-cases in the field of space based cyber security applications are explained.