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Space Systems and Architectures Featuring Cross-Platform Compatibility (7A)

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TUBIX – THE TU BERLIN INNOVATIVE NEXT GENERATION NANOSATELLITE PLATFORM

**Abstract**

TU Berlin is presenting a novel, adaptive nanosatellite platform series, called TUBiX (TU Berlin innovative neXt generation satellite bus). Currently two TUBiX platform classes are under development, TUBiX10 and TUBiX20.

TUBiX10 is a nanosatellite bus for 10 kg class satellite missions. The bus envelope is a cube with 25 cm edge length. It is launched in a closed container called SNL (Single Nanosatellite Launcher) and then separated similar to a CubeSat. Hence, the interface of the satellite to the launcher is significantly simplified. The bus subsystem components are highly integrated while still maintaining a high degree of modularity. The first mission based on the TUBiX10 bus is S-Net, which will demonstrate an S-band inter-satellite communication network with four satellites. The S-Net satellites are due to be launched in 2016.

TUBiX20, a nanosatellite bus of the 20 kg satellite class, can be adopted to support a broad range of missions. Unique features of TUBiX20 are the generic structural design, the single-failure tolerant bus architecture, as well as the adaptive attitude control system. The octagonal structure maximises the surface available for solar cells and can easily be tailored to the space requirements of bus sub-systems and payloads. The single-failure tolerant bus design allows any one component to fail, without endangering the mission. The adaptive attitude determination and control system supports adding or removing attitude modes, sensors or actuators to meet the requirements of a certain mission without having to redesign the software.

The first mission to be based on TUBiX20 is TechnoSat, whose mission objective is the on orbit verification of several novel nanosatellite components. This includes a new star tracker for nanosatellites, a fluid-dynamic actuator, as well as a new separation system for satellites up to 50 kg. TUBIN (TU Berlin Infrared Nanosatellite), the second mission based on TUBiX20, has the objective to demonstrate new Earth remote sensing technologies for nanosatellites. Furthermore, the TUBiX20 high performance attitude control system will be verified and tested within the TUBIN mission. TechnoSat is scheduled to be launched in Q3 2014, whereas TUBIN will follow in Q3 2015.

This paper focuses on the configurability of the TUBiX platform regarding the volume, power and attitude control requirements, which allows tailoring of the bus to the requirements of a broad range of missions.